

SOCIAL TECHNOLOGIES IN SHIPBUILDING WORKSHOP

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FOREWORD

The human resource is the single most important asset employed in the production of ships.

This document is the proceedings of a workshop devoted to an analysis of how American shipyards might more effectively use this resource through application of social technologies.

Social technology is a term unfamiliar to many of us in shipbuilding, as is the concept to which it refers — innovative organizations of work and human resource management practices employed in experimental or quasi-experimental settings for the purpose of improving performance in the workplace.

The overall objective of the workshop was to examine both the content and the process of social technology applications in shipbuilding. There are two principal schools, or orientations, in this regard, both of which were covered in the workshop — group-oriented approaches (worker participation/ organizational development), and individual-oriented approaches (behavior modification).

The workshop was structured to allow for presentations and discussion on the following sequence of topics:

- . identification of human resource problems and opportunities in shipbuilding,
- l description of available social technology solutions, and
- l discussion of how shipyards might collaborate in a program of social technology experimentation and information exchange.

The workshop was held May 3-5, 1983 in Linthicum Heights, Maryland. It was sponsored by the Education and Training Panel of the Ship Production Committee. Participants including representatives of U.S. shipyards, labor unions, universities, research organizations, and the U.S. government.

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- l Dr. J. Maxwell Elden, Norwegian Technical University
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MICHAEL E. GAFFNEY is a senior staff officer of the Marine Board, National Academy of Sciences. Dr. Gaffney, an anthropologist, has as his principal research interest the organization of work — more specifically the organization of work in maritime occupations (he is also a licensed deep sea mariner and Great Lakes pilot). He has conducted field research in organizational change in the Canadian offshore fishery and in U.S. merchant shipping. He has organized industry seminars on these topics, and for the past several years has served as staff officer for a number of National Research Council committees investigating the prospects for organizational innovation in the shipping and shipbuilding industries. Dr. Gaffney has published a number of papers on these topics and is a member of the Human Factors Panel of the Ship's Technical Operating Committee of the Society of Naval Architects and Marine Engineers.

PETER LAZES is a labor/ management consultant who has helped establish and guide employee participation activities in both the public and private sectors for over 13 years. In addition to current work with Xerox Corporation and Bell Laboratories, he helped to establish quality of work life activities at Sun Shipbuilding and Drydock Company. Dr. Lazes has been on the staff of, and has done consulting work for, numerous hospitals, neighborhood health centers, and mental health centers including the Tufts New England Medical Center and Martland Hospital in Newark, N.J. He has been a faculty member of Tufts University, the New Jersey Medical School, Livingston College, and New York University. Presently, he is Co-Director of Programs for Employment and Workplace Systems at Cornell University, which is involved in research and the development of projects designed to integrate social and technical resources of organizations.

INTRODUCTION

Michael Gaffney

Origin of the Workshop

A chronology of events leading to, and shaping, this workshop would most appropriately begin nearly five years ago with two distinct, yet complementary, developments in American shipbuilding. One was the initiation of experimentation with worker participation techniques in several commercial and naval yards. The other was the transfer of Japanese shipbuilding production methods to the United States, including the introduction of new organizations of shipyard workforce and Japanese management principles.

The industry's expanding interest in worker participation activities led to the inclusion of a quality circle training project in the first year (FY '82) program plan of the newly established Education and Training Panel (SP-9) of the Society of Naval Architects and Marine Engineers' (SNAME) Ship Production Committee. As originally scoped, that quality circle project was to include management presentations at individual shipyards, a training program for facilitators, and production of a video tape for refresher use.

But before that project was initiated, several events in the summer of 1982 suggested that the effort should be redirected. A Human Resources Workshop hosted by the National Academy of Sciences Committee on Navy Shipbuilding Technology concluded that labor and management should conduct further experiments with expanded uses of the shipbuilding workforce, and that information and experience gained thereby should be shared between yards. These conclusions were eventually incorporated into the committee's final report:

The Navy should encourage experiments with worker participation and organizational change by considering requests from industry (labor and management) to share in the costs of experimental programs; and, by means of a continuing periodic forum, foster the transfer of information between companies and unions involved in or considering social technology projects. The forum would allow both the Navy and commercial yards to share their growing expertise with productivity-related social technologies (National Academy of Sciences 1983:79).

That same summer, the Five Year Plan of the Institute for Research and Engineering for Automation and Productivity in Shipbuilding (IREAPS) also called for the formation, within the structure of the SNAME Ship Production Committee, of a panel dealing with topics of both group and individual-focused human resource innovations in shipbuilding.

The importance of human resource issues coupled with the required time investment in this area and the primitive state of human resource development in the industry dictates that an ongoing program be established to exploit areas of productivity improvement through the effective use of manpower (IREAPS 1982:1-37).

Independent of the IREAPS Program Plan, the panel chairmen of the SNAME Ship Production Committee recommended that the Education and Training Panel consider expanding its purview to include workforce experimentation issues.

All of which led the Education and Training Panel, in the fall of 1982, to reassess its quality circle training project. What would be more useful, it was felt, would be a workshop in which shipyard management and labor could jointly examine a range of human resource innovations (not just quality circles). In addition to serving as a valuable one-time educational experience, the workshop might also explore prospects for the formation of a continuing program of shipbuilding social technology research and information exchange. The workshop reported in this proceedings was designed with these objectives in mind.

Social Technology Defined

The title of the workshop contains an expression, social technologies which is unfamiliar and requires some explanation. As earlier mentioned, one adjustment made to SP-9'S original plan for a quality circle training project was to expand the subject matter to include a wider range of innovations rather than to focus exclusively on quality circles, or even on the category of worker participation. It was desired that the workshop cover not only these group-oriented innovations, but also those which focused at the level of individual performance improvement. More familiar generic labels such as human resources or human relations were sufficiently broad, but did not indicate the degree of formalization and practical application that is characteristic of these approaches. This fault was not shared by the expression social (technologies, terminology introduced by the National Science Foundation in a recent review of emerging issues in science and technology (Tormatzky 1982).

Social technology refers to innovative organizations of work and human resource management practices employed in experimental or quasi-experimental settings for the purpose of improving performance (quality, safety, efficiency) in the workplace. Although there is no clear-cut boundary as to the types of human resource innovations that might fall under this rubric, the principal categories at the present time appear to be: 1) worker participation (quality circles, quality of work life, 2) work redesign or sociotechnical systems (autonomous work groups, multi-skilled workers), and 3) behavior modification (human performance engineering, performance management).

Workshop Objectives

The overall objective of the workshop was to examine both the process and content of social technology innovation in shipbuilding. Cement coverage included consideration of both group-oriented (worker participation), and individual-oriented (behavior modification) approaches. Process discussions covered topics ranging from preconditions to undertaking a change project, to start-up strategies, evaluation procedures, project expansion models, and reward systems.

The specific objectives of the workshop were four, reflecting the history previously outlined:

1. Provide shipbuilding management and labor with expert discussion of various social technologies as they have been developed within other U.S. industries and shipbuilding overseas.

This was one of the functions of the faculty. Several workshop and plenary discussion sessions were preceded by faculty presentations.

2. Provide a forum for the exchange of social technology views and experience among yards (there are a number of U.S. yards that have had recent and continuing experience with these techniques).

This was accomplished by means of frequent and extended workshops and plenary discussion sessions.

3. Provide individual yards with the opportunity to review their current social technology programs and/ or to make plans for new initiatives.

This unscheduled activity was undertaken during free periods at the option of individual yard teams.

4. Provide a discussion of the possible formation of a continuing cooperative (multi-yard, multi-union, government) program in shipbuilding social technology.

This issue was specifically addressed at the conclusion of the workshop.

Workshop Structure

The workshop was structured to allow for presentations and discussion on the following sequence of topics:

1. What are the human resource problems/ opportunities in shipbuilding?
2. What social technology solutions are available?
3. What other innovations support and sustain social technology interventions?
4. Is there anything shipyards might do on a cooperative basis?

First, and foremost, the program was designed to allow ample time for the participants to talk to one another. This was a unique event for any industry (the gathering of a number of organizations and their unions having experience or interest in human resource innovation), and the sharing of information and views between these principals was potentially of greater value (and much more difficult to duplicate) than any exchange between participants and faculty. For this reason the meeting was designed principally as a workshop.

Second, the program incorporated a considerable degree of flexibility with regard to workshop topics. It was difficult to predict with precision those subjects on which the participants would wish to spend most time. Not only does the expression social technologies embrace a wide range of techniques, there are also a number of issues relating to the application of social technologies. Some yards wished to discuss quality circles while others were more interested in autonomous work groups or behavior modification. Similarly, some yards wished to concentrate their attention on the details surrounding the initiation of a change program, while others with more

experience were concerned with variations of supporting gainsharing plans. Therefore, a portion of the program was devoted to concurrent special interest workshops. The topics for which were selected by the participants themselves.

The following is an annotated version of the workshop agenda:

May 3 (First Day)

8:30 Introduction

The history leading to the workshop, the concept of social technologies, and the objectives and structure of the two and one-half days.

9:00 Problems and Opportunities

A presentation of problems and opportunities facing the U.S. shipbuilding industry and their relationship to social technology solutions. This presentation was based largely upon survey data and international comparisons.

9:30 Problems and Opportunities Workshop

For this first workshop, four groups were formed on the basis of industry function. Two consisted primarily of production engineering managers, while the other two were formed of industrial relations and personnel managers. The charge was to identify from these two functional perspectives, significant human resource problems and opportunities in shipbuilding.

10:30 Problems and Opportunities Plenary Discussion

A further discussion of the same topic in which the perspectives of the four workshop groups were compared.

12:30 Guest Speaker — Mr. Wayne L. Horvitz

Mr. Horvitz, a member of the National Academy of Sciences Committee on Navy Shipbuilding Technology, and former Director of the Federal Mediation and Conciliation Service, discussed the association between social technology experimentation and labor-management relations. As former Executive Director of the Retail Food Joint Labor-Management Committee, Mr. Horvitz also spoke on the issue of industry-specific cooperative social technology programs.

1:30 Worker Participation

Worker participation techniques were presented as a continuum, from rudimentary quality circles to more sophisticated autonomous work groups and very recent efforts directed toward participatory research. Basic concepts were discussed, employing both U.S. and foreign, shipbuilding and non-shipbuilding, case studies. The format for this session consisted of faculty presentations, films, and plenary discussion sessions.

4:30 Planning for Open Workshops

A period of time set aside for the identification of those topics on which the participants chose to concentrate on the afternoon of the second day.

May 4 (Second Day)

8:30 Behavior Modification

A presentation and plenary discussion devoted to individual-focused (cf. group-focused) techniques of improving organizational performance.

10:00 Supporting Innovations

A presentation and plenary discussion covering a number of issues associated with social technology innovation (e.g., relationship to collective bargaining, gainsharing, program evaluation).

12:30 Guest Speaker - Mr. Leslie Calder

Mr. Calder, National Director of the Xerography Division of the Amalgamated Clothing and Textile Workers Union, spoke on the experience of his union with a social technology program at Xerox Corporation.

1:30 Open Workshops, Session #1

Concurrent workshops on a number of topics identified by the participants the first afternoon:

1. Choosing a strategy & starting up
2. Planning for the shipyard of the future
3. Evidence, evaluation, and assessment

3:30 Open Workshops, Session #2

Another round of concurrent workshops focusing on topics of particular interest to the participants:

1. Limited structural change
2. Socio-technical systems
3. Reward systems

8:00 Guest Speaker — Dr. Guy Leonard

Dr. Leonard (Director of Productivity Management for the Assistant Secretary of the Navy for Shipbuilding and Logistics) spoke on the Navy's interest in, and approach toward, human resource productivity improvement.

May 5 (Third Day)

8:30 Panel Discussion

Workshop leaders from the preceeding afternoon's open workshops reviewed in plenary session the discussions of their respective groups.

10:00 Cooperative Program

Presentation on the structure of cooperative social technology programs in other industries, both in the United States and overseas. This was followed by a plenary discussion of the prospects for such a cooperative program for American shipbuilding.

11:30 Close

Closing remarks by Professor Howard Bunch, Panel Chairman of SPC'S Education and Training Panel, sponsoring organization for the Workshop.

SHIPBUILDING HUMAN RESOURCE PROBLEMS & OPPORTUNITIES

Michael Gaffney

This section might have been titled What's broke that needs fixin? Before launching into a two and one-half day discussion of solutions, it is important that we first identify the nature and range of problems faced by the shipbuilding industry. The latter portion of the title for this section, opportunities, reflects the positive side of otherwise gloomy economic conditions. Whether viewed as a problem, or as an opportunity, the subject of the current discussion is the changing environment in which American shipbuilding finds itself in the 80's, and the degree to which the situation calls for social technology solutions.

This discussion will be oriented around three categories or problem areas (productivity, safety, job satisfaction) which are not proposed to be either exhaustive or exclusive.

Productivity

A comparison of data from a sample of American and foreign yards indicates that labor productivity in U.S. shipbuilding is generally only half that of Scandinavia and Japan (A&P Appledore 1980:1-4). Of this total, 30-35 percent of the difference is attributed to . . . superior organization and systems and a more effective workforce in the foreign yards (1980:7-10). This is a pretty fair indication that the potential of the U.S. shipbuilding workforce has not been sufficiently tapped.

What Appledore refers to by . . . superior organization and systems and a more effective workforce . . . are the related concepts of organizational decentralization, de-bureaucratization, and flexibility

One of the greatest differences in contemporary shipyards is the degree of organization of work and its effect upon the productivity of the man. The high craft skill possessed by some shipyard workers has enabled the adoption in the appropriate companies and countries of a minimum of formal organization. This circumstance is usually accepted by the management in search of a great deal of flexibility (A&P Appledore 1980:10-3).

The characteristic organization of U.S. yards is at the other extreme in this matter of flexibility. A 1978 survey and comparison of U.S. and foreign shipbuilding technology levels included a category Organization and Operating Systems. Although the multi-element comparison resulted in overall similarity between U.S. and foreign levels in this category, one constituent element of that classification showed a major divergence, the one concerning flexibility in the assignment of work and supervision of the workforce. The American yards are characterized as rigidly bound by trade structure; their foreign counterparts are described as having either high levels of flexibility and interchangeability, or maximum flexibility through workstation organization (Marine Equipment Leasing 1979:111-32).

This rigidity of organization is not a problem peculiar to American shipbuilding but is characteristic of U.S. industrial organizations in general. It has been attributed, to a large extent, to the influence of scientific management as developed by Frederick Taylor and institutionalized in the form of industrial engineering. It has to do with the concept of a job. Scientific management encouraged the precise and formal description of jobs based upon techniques of task analysis and work measurement. The more circumscribed each job description, and the fewer tasks entailed, the better for purposes of assignment of standard production norms. This one-dimensional, hierarchical, and bureaucratic management approach was complemented and reinforced in the United States by the newly forming unions' interest in unambiguous and discreet job classifications for purposes of operating a strict seniority system (Piore 1974:81).

It appears that in this matter of workforce flexibility Japanese shipbuilding may be even further advanced than other Japanese industries. In their comparative analysis of three modernized Japanese companies (sake distillery, appliance factory, and shipyard), Marsh and Mannari were particularly struck by the emphasis on job diversification in shipbuilding. Both in their interview and questionnaire response, the majority of the shipyard workers voiced a preference for multi-skill jobs (1976:83 & 91-92). Marsh and Mannari note that flexibility extends to managerial levels as well, especially in middle management ranks (1976:50).

The Scandinavian shipbuilders have also developed a highly skilled and highly productive workforce operating under the principle of flexibility and interchangeability. Such practice makes most sense in those countries and industries in which a comparatively narrow wage range encompasses the skilled, semi-skilled, and unskilled workers (A&P Appledore 1980:3-7).

The British shipyards, which have gauged their performance against the considerably more productive European yards, refer enviously to continental style working arrangements based upon full flexibility limited only by the competence of individuals to carry out work assignments.

The principle of one man, one trade, one set of skills, is no longer viable. What is required of tomorrow's tradesman is that his skill and knowledge should be multi-faceted and that full use should be made of the whole range of an individual's intelligence and potential skills (Flack and Nichol 1980:37).

The skilled trades are not the only focus of efforts toward achieving greater flexibility. Another related element of Japanese shipbuilding organization has to do with decentralization of professional staff functions. At Ishikawajima Harima Industries (IHI):

Production engineering is a function of the production workshops, each of which has its own Production Planning and

Engineering Group. These groups are each made up of a staff of engineers who are responsible for specific activities related to the optimum utilization of facilities, processes and manpower on each hull construction project. This activity includes the analysis and continual improvement of production processes to realize improved productivity (Colton and Mikami 1980:30).

It is this continual analysis of the production engineers working in close contact with the production workers that serves as the basis for refinement of detailed working drawings, procurement specifications, and materials list.

In this regard there is a great deal of collaboration between designers and workshop staff engineers. Production information is an integral part of the development of the working drawings and production engineers provide a continuous feed-back of data to improve the usefulness of the drawings for the production workshops (Colton and Mikami 1980:30).

Although Livingston Shipyard reports an independently invented production workshop structure similar to that of IHI, the American yard has retained centralized rather than dispersed engineering staff functions (Colton and Mikami 1980:67). Avondale has moved in this direction by holding weekly meetings between engineering and production groups for the purpose of reviewing plans (Mongelluzzo 1981:11A). Although considerable interest has been generated in U.S. shipbuilding circles for design/production integration, concentration thus far has been in the development of an electronic interface (CAD/CAM) rather than the dissolution of organizational barriers.

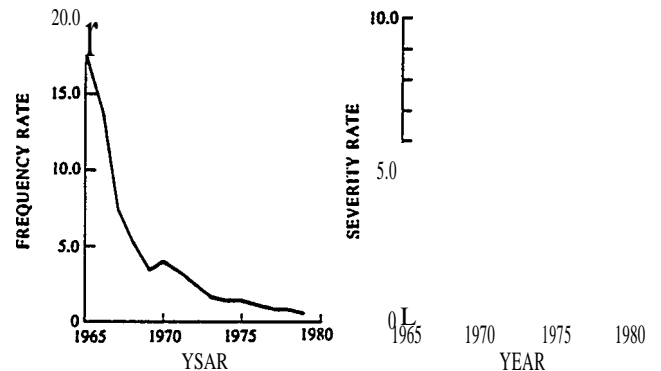
Similarly, Colton and Mikami describe as striking the IHI system of decentralization of scheduling. Again, the staff engineers that perform this function are found at various levels of the hierarchy, yet manage to produce schedules of different degree of detail that agree with each other. The Livingston approach, in contrast, entails scheduling at the gross level by the Central Planning and Control Department, and at the detailed level by the Production Planning and Control Department. Livingston has announced its intent to experiment with decentralization of detail planning (Colton and Mikami 1980:57).

On this subject of flexibility, a survey of American shipyard worker job satisfaction revealed that the most common spontaneous complaint of production workers relating to working conditions did not have to do with shortcomings of the physical facilities. Rather, the workers complained of poor planning, poor schedule coordination, and poor communications (both between crafts and between production workers and staff services) (Meunch 1976:3-9).

Safety

It was safety and not quality or productivity that was the concern of the Japanese shipbuilders in the mid-60s when they first experimented with small group techniques. The industry during that period was very concerned with the escalating frequency and severity of yard accidents — accidents due, in the opinion of Dr. Shinto, then Chairman of IHI, to the fact that the expansion and competitive position of Japanese shipbuilding up to that point had been . . . based on the physical energy of the workers (1980:26). Compulsory enforcement of safety measures provided only temporary improvement, and it was not until the introduction of the small group movement,

and management's immediate attention to the problems identified by these worker groups . . . regardless of expense . . . that a steady long-term improvement of safety records was realized (Shinto 1980:22). At IHI, the success of the initial safety effort led to the expansion of the small group program to the full yard by 1972-74. This dramatic and continued safety improvement is depicted in Figure 1.



Note: Accident frequency rate worker injuries per million working hours; accident severity seventy thousand working hours.

FIGURE 1
Frequency and Severity of Shipyard Accidents at Ishikawajima Harima Heavy Industries Co., Ltd. (IHI), 1965-1980
SOURCE: Shinto (1980)

Perhaps an even more dramatic statistic is that there occurred in 1980 less loss-time accidents in all the Japanese yards than in one single American yard (Gilbride 1982) — and the total tonnage delivered for all American yards that year was only about one-tenth that of Japan (Maritime Administration 1981) (Naval Sea Systems Command 1981).

Job Satisfaction

One cause of current productivity ills has been identified as a new value system among younger workers. This phenomenon is referred to by futurist Alvin Toffler as the New Wave, by sociologist Daniel Bell as the Age of Entitlement, and its product, by survey researcher Daniel Yankelovich, as the New Breed. What is common to all these interpretations is the recognition that contemporary workers seek more intrinsic satisfaction from their work than did preceding generations for whom traditional workplace organizations and management styles were designed.

It is quite clear that this value shift has played a role in shipbuilding overseas. Note the comments of an American shipbuilding welding study team which visited ten Japanese yards in 1973:

In the generally tight labor market, Japanese shipyards are finding it increasingly difficult to attract new employees. Changing attitudes of young people towards working in a shipyard environment and performing monotonous repetitive jobs such as manual and gravity welding have prompted management to explore new approaches to the recruitment of shipyard workers. For example, to improve the industry image with respect to both employees and the general public the yards are giving increased attention to landscaping, recreational facilities, and subsidized food and housing. Auto mileage

allowance is offered to some employees in lieu of subsidized housing. Women are employed in some yards for gravity welding and are often permitted to work individual schedules compatible with their family responsibilities (Brayton et al 1973:2).

That report is ten years old: but even in the depressed market of the 80's Japanese shipbuilding management is still faced with rising expectations of their workforce. A NKK manager states:

We are not afraid of AWES (Association of West European Shipbuilders) and we are not afraid of the NICs (newly industrialized countries). We are more worried that we won't be able to get the workers to do the dirty jobs in the future (Seatrade 1981:135).

Seatrade reports that the NKK view is not atypical:

This seems to be the common attitude in management throughout the Japanese shipbuilding industry — give them the men and they will worry about getting the orders (1981:135).

Shipbuilders in the newly industrialized countries may also, to some degree, be experiencing the same phenomenon. The president of Daewoo, Korea's newest and largest shipyard, claims that

The time for lower wage earners in Korea is over. But they do not work only for the money: they really care about searching for more efficiency, better productivity, better quality (IOOAI 1982:12).

Although a higher educational level is only one element of the workforce profile associated with this value shift, it is interesting to note that even for shipbuilding, which is not generally considered to be an industry which attracts the best and the brightest, the Asian and European yards which practice participatory management highlight the educational level of their workers.

Dr. Shinto, speaking of IHI's initial experience with participatory management, says:

At the start there were various inconsistencies, but the activity took root far earlier than had been expected. It was felt that the workers, who had previously no way of realizing or instituting their own proposals and thoughts, had been given a voice in a very useful way. (A)lmost all workers had a twelve year education, they had their own good sense, and their participation in the improvement of the production techniques and working conditions gave them greater satisfaction in their work. The results of this program of worker involvement exceeded our expectations (1980:27-28).

Educational level of the workforce, and its potential provision of comparative advantage in international shipbuilding is recognized as well by the Norwegians. The logic which underlies a six year, nine year, industry-government cost-shared social technology program in shipbuilding is as follows:

If we presume that Norwegian shipyards will continue to build and equip ships and other steel constructions for maritime use, which of these factors (products, production technology, organization/ human resources, administrative systems) should be our prime objective in the endeavour to increase our competitive ability? Our answer to this is organization/human resources. Technology as such is international in character and easily transferable between countries. Not so with human resources. The possibilities of releasing the productivity potential of human resources depend much more on national conditions. Conse-

quently, our relative competitive ability will primarily depend on how well we have a good basis for this in Norway. The general level of education is high, and relations between the main parties in economic life are comparatively good. Therefore, we should direct our efforts towards making the most of these advantages (Westhagen and Hotvedt 1980:18).

By comparison, the educational level of U.S. shipyard workers is probably lower than in Japan or Scandinavia. As of 1970, 52 percent of American shipyard workers had completed high school and six percent were college graduates (Figure 2). This might suggest that the U.S. shipyard employee

Industry	percentage of Employed Males Completing:	
	High School	College
Construction	43.8	3.9
Manufacturing	55.8	9.9
Durable Goods	56.5	9.6
Motor Vehicles	54.1	5.7
Aircraft	73.0	18.5
Shipbuilding and Repairing	52.3	5.7
Private Wage and Salary Workers	48.6	5.7
Government Workers	60.5	5.9
Railroad Equipment	54.5	5.7
Age 16 and over		
Includes boatbuilding and repairing		

FIGURE 2
Educational Attainment of Employed Males in Selected Industries. 1970
SOURCE Bureau of the Census

would be less inclined toward, or capable of, self management than his overseas counterpart. The fact that participatory management was earliest realized within Japanese and European yards (since the late 60's) may be supporting evidence. But the general population surveys upon which the notion of worker dissatisfaction is based, have been conducted in the United States as well as overseas. A study by the U.S. Chamber of Commerce shows that 80% of American workers today believe that they could improve productivity if management would only listen to their ideas (U.S. House of Representatives 1981:12).

Other evidence of American worker interest in, and capability for, self management is found in the number of quality of work life programs in U.S. industries (auto, steel) whose workforce educational profiles are not unlike that for shipbuilding. Such programs are prospering, even in the U.S. construction industry which has the lowest educational profile of the industries appearing in Figure 2 (Ross 1981). What is most interesting about Figure 2, is the sizeable difference between the educational profile of the private and naval yard workforce. Whereas only the construction industry has a lower level than private shipbuilding, the naval yards are fully 12 points higher and are exceeded in the category of manufacturing only by the aircraft industry.

Another revealing, though isolated, statistic suggests a considerable shift in the age and education of at least the naval yard workforce. Forty percent of the apprentices enrolled in Pearl Harbor Naval Shipyard's training program have completed between 2-4 years of college (Hartigan 1982). These statistics may explain why it is that the naval yards were the first to experiment with participatory management in U.S.

shipbuilding, they may also suggest that lower educational levels may have been only a braking rather than disqualifying factor.

There is evidence of widespread worker dissatisfaction with non-participatory management styles in American shipbuilding. The result of interview and questionnaire analysis of 1300 production workers and professionals in ten U.S. yards revealed that:

Many believe that their company's management has no interest in them as persons, is unaware of what they do, and is oriented to machines rather than people. Most hourly production workers believe that they do not influence the company in any important ways. The fewer than twenty percent of the workers who believe their influence is important perceive that influence to come primarily in the way they perform their own job. The majority of workers who believe that they cannot influence the company in important ways cited that it was futile to try, that the company didn't care or was too big or set in its ways, or that their low position or lack of knowledge prohibited their influence (Meunch 1976:4).

Even more important to the shipbuilding professional group is what they believe to be an unhealthy company attitude in the sense that they perceive the company to demonstrate little interest, respect or appreciation to their professional workers (1976:3-43). Of all the personnel groups, fewer of the professional workers perceive that the company gives them the feeling that they are important in getting the job done, and fewer than one-half of the professional group believe that they can influence the company in any important way. The professional group has the greatest predilection to consider moving to another company and, along with job availability, a primary cause for this need for mobility is the professional's perception that the company doesn't care (Meunch 1976:3-45).

To summarize, the aptitude logic or argument for participatory management, while perhaps stronger in Japan and Scandinavia, yet obtains for U.S. shipbuilding, even in the private sector. Forms of participatory management are now being experimented with and adopted here as well. There has been a delay, to be sure, but there has not been any program failure on the basis of deficiencies in the self-management inclination or capacity of American shipyard workers. To the contrary, survey data shows that both production and professional workers in shipbuilding desire greater technical and managerial responsibilities.

Summary

Perhaps indicative of the culture of U.S. shipbuilding, is the very considerable difference between U.S. and overseas attention to the physical environment and amenities of the yard. It was in this category Environment and Amenities that the 1978 survey and international comparison of shipbuilding technology levels revealed the largest U.S./foreign disparity. While some of the large-scale environmental deficiencies of the U.S. yards may be attributed to their age, Lowry, Stevens, and Cragg note that inferior amenities such as canteens, washrooms, toilets, lockers, etc., could be fairly easily remedied by local management initiative (1980:164,162). In contrast, they point out that the high standard of amenities provided Japanese and European shipyard workers are either demanded by the workforce, . . . or are provided by the company for other reasons (1980:164). As has been demonstrated, those other reasons have to do with

attracting and retaining a high quality labor force, one suite to new ways of working.

Hood, in a review of the Lowry, Stevens, and Cragg analysis of the Appledore survey, rises to the defense of the U.S. shipyards, pointing out that the industry has actually done quite well in technology upgrading in spite of political, social and environmental factors over which the industry has little control. He gives three specifics:

1. costly U.S. regulations and standards, more stringent than those found abroad,
2. the comparative negligence of government stimulus assistance in the United States, and
3. the differences in shipyard work practices, motivation, and ethics (Lowry, Stevens, and Cragg 1980:169).

Granted, the first two problem areas may be of a sort that do not lend themselves to unilateral action on the part of the industry. It is not so clear in the latter case, however, that the industry cannot on its own, and without need of large coalitions, modify its own work practices and improve the motivation of its own workforce. To the contrary, industry leadership may innovate in the way the workforce is organized and used — through individual initiatives, joint labor management experiments, and collective bargaining.

The alternative is to continue with the traditional arrangement in which:

- engineering, planning, and scheduling are accomplished only by centralized planning,
- development of safety improvements is the exclusive responsibility of safety engineers,
- quality is the reserved function of the quality assurance department,
- production workers (and even professionals) perform only limited range of tasks and no others, and
- problem solving and decision making remain the sole preserve of full-time managers.

The record thus far suggests that individual competence, and not bureaucratic boundaries, should set the limits of employee participation in technical and managerial tasks. It appears that this may be the key to turning a workforce into a human resource.

Discussion

Howard Bunch I'd like to pursue this issue of improving safety through small group methods. I've read what Dr. Shinto has said, but it is difficult to make the connection between the operation of small groups and the realization of such dramatically improved safety results. There were a great number of other innovations implemented at that time (early 1960s) in Japanese shipbuilding that seem more clearly related to safety improvements. The Japanese, for example, were also making progress at that time in the standardization of parts, construction of permanent jigs at the construction site, and the elimination of almost all scaffolding. The connection between these innovations and improved safety seems clear to me. The connections between small groups and improved safety is no

Mike Gaffney I can't speak for Dr. Shinto, but I can offer some probable explanations for the connection between small groups and improved safety. The first explanation is very straightforward. Nobody knows the sources, and perhaps the cures, of safety problems better than those working closest to

the job. To the degree that a worker participation or small group structure gives production workers more responsibility and authority for safety prevention and cure, the more likely that the most important problems will be addressed with the most appropriate solutions. The second explanation has to do with the efficiency of working with the same people day in and day out. Continuity of association within a work group, which is afforded by small groups as contrasted with functional divisions within a yard, allows individual workers to be assigned work within their capabilities. A third explanation, though the least obvious, may be the most important. It has to do with the ethos or spirit of the workplace. Reports on the success of U.S. shipbuilding quality circle programs invariably follow a listing of cost/benefit ratios and single project dollar savings with words to the effect that the most significant result of the program lies in the change in attitudes overall. Group-focused programs seem to lead to improved attitudes or motivation that affect all aspects of the operation of the yard. Since safety is generally a desired by-product rather than a principal objective of manufacturing processes (production volume and quality are principal objectives) it is more sensitive (than production volume or quality) to by-product characteristics of the manufacturing environment (such as attitudes).

George Roper The culture of a yard is very important to safety, and it is determined far more by the attitudes of the skilled trades than by those of management. If small groups improve the attitudes of the trades, then they will result in a shift of yard culture. And if yard culture is improved, safety will be dramatically improved.

Gerald Swanson Lockheed's experience last year mirrors that reported for the Japanese. The yard set a goal for accident reductions an objective tied into a payback for all employees. In one year we reduced our accident severity rate by over 67 percent, and our accident frequency rate by over 57 percent. This achievement might have been realized in the absence of

the process in some other way. At Lockheed, however, we used the quality circles to communicate the objective, and responsibility, to everyone in the company.

Mike Gaffney Perhaps that is the connection we're looking for. The presence of small groups within an organization provides for better definition of, and identification with, company objectives.

Ande Abbott From my own experience in shipbuilding I can recall that in the mid 60s there was a pronounced shift from a traditional arrangement, in which crews of men (working crews) worked regularly for the same supervisor, to the present arrangement in which men are shifted all around the yard. The rationale was to better employ skills where and when needed, but the change coincided with a startling rise in the number of accidents. It seems logical that this would be the result of an arrangement in which men work daily in groups of near strangers.

Mike Gaffney That's interesting as there are a number of industries which are now reinventing traditional small groups. That is certainly the case for longshoring and for coal mining.

Jack Garvey I just want to underscore the relationship between safety and attitudes. Recall that the Meunch (SP-5) survey of 1300 shipyard workers showed the degree of unhappiness with the fact that scheduling and planning were so poor and that management didn't appear to care very much

about the workforce. This clearly is not very conducive to a positive yard culture toward safety.

sure we will turn to many time in the next two days. I want to suggest that the linkage between small group processes and improved performance has to do with ownership. This relationship was very clear during the project at Sun Shipbuilding. The workers at Sun participating in the work groups realized that their safety was now clearly their responsibility and that they were given the wherewithal to deal with safety problems. They were no longer the objects of safety programs, they were the owners of safety programs. And consequently they made them work. You know, the Scandinavian countries have numerous safety laws on the books, but these regulations have been found to be ineffective in comparison to shopfloor efforts which are felt to be owned by concerned workers.

Dan Romanchuk We have to be careful with the Japanese statistics, however, because it is likely that they do not define loss time accidents in the same fashion as we do, and that the difference probably exaggerates the figures for this country.

PROBLEMS AND OPPORTUNITIES

Workshop Discussion

For this first workshop session, four groups were formed on the basis of shipyard function. Two panels consisted primarily of production engineering managers, while the other two were formed of industrial relations and personnel managers. All groups received the same charge — to identify significant human resource problems and opportunities in shipbuilding. What follows are reports of the groups in a concluding plenary session.

Panel #1 Jim Acton, Dan Rornanchuck, John Roper II, Jack Garvey, Mike Gaffney, Gene Chambliss

Jim Acton Our panel discussion focused on the problems that will likely be faced by worker participation activities in shipbuilding.

1. Unstable Workload With the fluctuation of workload presently experienced within U.S. yards (and generally decreasing), employee involvement teams will likely find their membership in a constant state of flux. It is unlikely that they will enjoy the luxury of operating with a constant and unchanging composition of the standard 10 to 12 individuals. As the yard workforce experiences rapid turnover, so too will these teams. This means that they will have to deal with the recurrent problems of selection and training. And for those members who do remain on the teams, they will likely be preoccupied with concerns for their individual situations, rather than those for the yard as a whole.

2. Union/Management Concurrence To what degree will labor and management identify the same problems or agree as to solutions?

3. Management Philosophy Then there is the matter of seriousness of intent on the part of management. Does management really intend to share some decision-making prerogatives? Or will worker participation programs be viewed only as "programs" that do not require any major rethinking of the roles of labor and management?

4. Union Philosophy And how serious will be the unions? Will they reconsider such work rules as strict craft integrity?

Mike Gaffney This issue of stable workload is a chicken and egg affair. On the one hand, most any productivity program requires a consistent level of production to achieve results. On the other hand, yards cannot improve their orderbooks until productivity gains are realized.

Panel #2 Walt Amory, Henry Jones, Ande Abbott, Max Elden, Don Kane, Bob Schaffran, Jay Leanse

Walt Amory

1. Trade Enhancement and Cross-crafting We currently have a situation in American yards where the trades are too specialized in one sense (e.g., only electricians pull cables, only welders do certain welding processes, etc.), and at the same time are not sufficiently well rounded in basic mechanics skills.

Any movement to provide all the trades with better training in basic mechanics skills (trade enhancement) and work rules that will allow them to use these general skills (cross-crafting) will be a step in the right direction.

2. Productivity and Quality The relationship between productivity and quality is sometimes viewed as inverse. As quality rises, productivity decreases, and vice versa. We strongly suspect that this is not the case.

3. Productivity and Quality of Work Life What is the relationship between the two? Will improvements in one necessarily lead to improvements in the other?

4. Long-term versus Short-term Focus For any meaningful improvement to take place in this industry it will be necessary for management to take a long-term view of performance — beyond the quarterly bottom-line. Improvements such as trade enhancement, quality, and quality of work life, are not short-term solutions. For the first year or two, such innovations may appear on the balance sheets only as costs. It takes some time for benefits to be achieved.

5. Engineering/ Production Connection It will also be necessary for organizational links to be forged between the technical and production departments. Technical expertise must be brought down to the shopfloor level. A great deal may be gained by allowing the engineers and the trades to jointly identify the problem procedures and processes — and their solutions.

6. Planning/Scheduling It is interesting to note from the 1300 shipyard worker survey, the biggest complaint the trades had regarding working conditions was the fact that there was a lack of planning, lack of tools, lack of material. In that regard, labor and management clearly share the same view. It might be a good place to start some joint productivity initiatives.

7. Training How best to integrate training for the skilled trades and for management?

Max Elden I want to stress the importance our group gave to this issue of combining the specialized knowledge of engineers with the practical knowledge of the trades. We felt that there are considerable productivity gains to be made in this area.

Howard Bunch I have a question regarding this group's definition of quality of work life. Were you referring to quality of work life in the broadest sense, synonymous with human resource programs of all types, or were you talking specifically of quality of work life as a specific type of worker participation program?

Walt Amory I believe we considered quality of work life in the broadest sense, improvements in all the areas where workers voiced complaints.

Bob Schaffran I think we were looking at the relationship between productivity and quality of work life in the same way that we examined the relationship between productivity and

quality. Our view is that one does not necessarily suffer as the other improves.

Howard Bunch So you would exclude behavior modification in that more restrictive definition of quality of work life?

Bob Schaffran Yes, I think so. And I think this is how the group was using the expression.

Panel #3 Joe Flynn, Ben Scribner, Bruce Bradley, George Roper IV, Peter Lazes, Bill Batt

Joe Flynn Our group limited those areas in which we felt that participative management could have most effect in shipbuilding.

1. Reduce Complaints We felt that this might be a key area for worker participation program impact. It certainly has been true for my yard. We did not advertise our quality circles as being the solutions to problems of quality or productivity. They were instituted principally to reduce the frustration people feel in their jobs, things that really bother them about their work. The theory is that if the quality circles provide a means for them to get together and solve these problems, then many of the other quality and productivity problems will take care of themselves. We think our program has been very successful at that. Therefore, after a worker participation program addresses employee complaints, it may also lead to improvements in

2. Increased Efficiency, improved quality, decreased turnover, improved continuity, improved planning and scheduling, improved material flow, improved skills, improved communication, improved dignity and improved job awareness (awareness of middle management to the issues being raised by the quality circles); all of these, of course, can lead to improved profits for the firm. A well run employee involvement effort should be able to address any of the areas we listed.

We also talked about implementing worker participation programs.

High level management commitment is essential for any major gains to be made.

- 1 Rigid job specializations will likely obstruct efforts to improve productivity through better use of human resources.
- 1 Product diversification is an area of improvement that might be addressed through such programs.
- 1 Gainsharing or some form of incentive program will likely be a necessary adjunct to worker participation efforts.
- . Education and Training will need to be improved, for labor and management.
- . And the values of the younger members of the shipbuilding workforce will have to be addressed.

Bill Batt We spent some time talking about the importance of middle management training. Ben, would you review what you were saying about Bethlehem's experience?

Bert Scriber At Bethlehem, we found that it was necessary to actually get middle management involved in an employee involvement process similar to that experienced by the trades, so that when the trades circles begin to make demands on middle management (improve this — or implement that), middle management would react positively rather than try to block them. In those plants where we started with middle management first, and then moved into labor/ management participation teams, the environment was already prepared.

We have tried it both ways at Bethlehem. Of course, all future activities with the trades will be in an environment where we have already attempted a unilateral change in management style toward greater participation.

John Roper II We spoke about incentives and Ben and I share the view that nonmonetary incentives (job satisfaction, pride in work, human dignity, improved working environment —where workers feel that they are engaged in the planning and scheduling to the benefit of the yard) are probably most effective. Monetary rewards can lead to a lot of problems, especially when it becomes necessary to cut them off.

Ben Scriber John made the point that if monetary incentives are around for any length of time, they are considered a right, and no longer function as an incentive.

John Roper II One problem with monetary reward systems is that they become very complicated and entrenched. The theory is that the more profit the worker can earn for the company, the more reward he gets himself. This can lead to highly subjective evaluations on the part of supervisors who may end up rewarding individuals for work they do for them, and not necessarily for the yard as a whole. This can lead to many problems.

Panel #4 Jim Early, Steve Sullivan, Gerry Swanson, Frank Long, Dan Denisen, Howard Bunch

Jim Early

1. Desirable and Undesirable Jobs We talked about two different types of positions or categories of work in shipyards. One category consists of jobs which have intrinsic interest and skills and have the potential for enlargement and improvement. The other category consists of those jobs that are simply hateful and despicable, and its not likely that we can make them any better (e.g., tank cleaning, sand blasting, working on a mast in the dead of winter). Although blue collar drudgery may generally be worse than white collar drudgery, there are also hateful white collar jobs such as driving a key punch. The questions i s: could we put our efforts into trying to improve the productivity of people with these undesirable jobs by trying to make them feel good about their jobs or feel like they are part of management? Personally, I feel that would be a waste of time.

2. Responsibility for productivity Who is responsible for productivity ills? Is it the fault of the fellows who are hammering, chipping, sawing, and welding? Or is the problem with the people who are supposedly in charge but can't get the right material in the right place at the right time — the people who line the painters up while the welders are still working? It is not at all clear that the problem is to be found at the level of the trades. Perhaps initial quality circle efforts should beat the level of management. Many of these problems are not of a nature that the trades can fix. Management level quality circles should address planning and production processes. Improvement in the integration of design and production is one area for attention.

3. Job Satisfaction and productivity What is the relationship? Does satisfaction guarantee productivity?

4. Balance of Power What sort of adjustments will be made between unions and management? It will have to move in the direction of management's sharing of power, and labor's sharing of responsibility. Unions will have to become more

flexible on work rules, especially those dealing with crew-crafting.

5. Timing When should these human resource programs be initiated? Just before a slump, during a slump, or when business starts to pick up?

6. Productivity Gap One thing seems clear; that there is a substantial productivity gap between U.S. shipbuilding and shipbuilding overseas, and that the organization and use of the workforce has a considerable impact on this gap.

Dan Denisen In our panel, there was some difference of opinion as to whether undesirable jobs should be the focus of an organizational development program. It raises an important point. Where do you focus your efforts? Where lies the biggest payoff? Do you tackle first safety, quality, or productivity? Do you concentrate first on the trades or middle management?

Ben Scribner One way of dealing with that question is to let the group select its own problems. There is generally no risk that they might come up blank. Often it is a case of a group having difficulty on which one of several problems to address first. But if management approaches them with a list of problems from which to select, that will likely stop them cold.

Bruce Bradley But what if a group wants to work on a problem that isn't really a problem, or one that will cause a problem for another part of the organization?

Ben Scribner This worker participation thing requires a certain degree of trust. We were quite surprised in steel when we first started out. We thought the groups would concentrate on problems like painting the restrooms or something relatively trivial like that. In fact, they wanted to start out on quality problems. The problems they selected were not at all trivial.

Mike Gaffney It should be pointed out, however, that not everything is up for grabs with these employee involvement teams. In some instances they are not allowed to do anything that runs counter to the labor contract.

Ben Scribner That is certainly true for the Bethlehem projects.

Peter Lazes But shouldn't the projects be focused? Perhaps these times require more of a focus than the general job satisfaction goals of the last decade. The issues of the 80's are no longer job satisfaction, they are productivity and competitiveness. It may be that the earlier approach to worker participation has to be adjusted somewhat to match the current economic environment.

QUALITY CIRCLES AND QUALITY OF WORK LIFE

Michael Gaffney

Central to the concept of worker participation (or participatory management) is the notion of decentralized decision making. The premise is that workers can often manage themselves better than they can be managed by echelons of managerial specialists. The logic which supports this view has several components.

Primary is the realization that workers closest to the job are in many instances most knowledgeable in terms of the technical and personnel requirements of the tasks. And even if this is not always the case, any innovation or redirection in the manufacturing process is much more likely to be successfully adopted if the workforce has some say in its design and implementation.

Worker participation techniques may be plotted on a scale or continuum. Most rudimentary and least threatening to traditional management structure is the basic multi-craft quality circle. At the other extreme would be group-oriented work redesign (multi-skilled workers, autonomous work groups). The present discussion is limited to quality circles and quality of work life.

Quality Control Circles

One manifestation of participatory management that has received more U.S. attention than any other, is that of quality control circles. Quality circles have their origin in the Japanese modification and application of Western principles of: diffuse management responsibility for quality, statistical techniques, and behavioral science concepts of organizational development. The new twist added by the Japanese was the extension of quality control jurisdiction and responsibility to every individual in an organization through the vehicle of small study groups — this in contrast to the traditional practice of relying upon specialist quality control engineers.

The quality circle concept was not, therefore, an element of traditional Japanese culture, but had very definite beginnings in the early '60s as Japanese management moved toward adoption of worker participation in decision making and small-groupism *shoshudanshugi*. Similar workplace experiments in Europe were observed by the Japanese, and by the end of that decade small group participative management practices were widespread throughout Japanese industry. A 1968 survey of 850 Japanese manufacturing companies revealed that 73 percent were practicing some form of participatory management through small groups. The shipyards were among the first industries to experiment with the new technique. That same year, the president of Hitachi Shipbuilding, speaking at the Annual Meeting of the Japan Federation of Employers' Associations *Nikkeiren*, could give a progress report on his company's experience with *aii*-employee participation (Cole 1979:134).

The term quality control circle is somewhat of a misnomer in that quality control is not an essential element or goal of such groups. In 1968 the Union of Japanese Scientists and Engineers reported that the existing circles were focusing only half their attention on quality control narrowly defined. Forty

percent of circle activities dealt with productivity and cost reduction, while ten percent were focusing on safety concerns (Cole 1979:134). We have already noted how safety and not quality or even productivity was the first concern of the Japanese shipbuilding circles. More recently, the small groups in shipbuilding, like their counterparts in other Japanese industries, have not limited themselves to a single problem area. As Shinto explains, productivity is the result of the combination of three elements: safety control, quality control, and efficiency control (1980:28).

Participatory management was introduced into the Swedish Kockums yard as a result of the findings of the Kockums Report (1970). This self-study revealed that the root of the yard's severe personnel problems was a new piece-work standards system which was introduced in 1967 with the transition from conventional shipbuilding to the factory shipyard concept. As a result of organizational changes made based upon the Kockums Report, including participatory management, labor turnover rates dropped by one-half and overall productivity was improved by a third (Hill 1973:51). In Norway, worker participation (along with improved physical conditions and improved recruitment and retention) has been a central aim of the Norwegian shipbuilding industry (Westhagen and Hotvedt 1980:14).

Although the United Kingdom lags Europe in its experience with participatory styles of management, there has been some movement in this direction. Speaking of the U.K. shiprepair industry, Nichols of the Tyne Shiprepair Group reports that a number of shiprepair companies now have joint monitoring arrangements of workforce involvement as shareholders or participants in profit-sharing schemes. In Nichols' opinion:

There cannot be lasting improvement within the U.K. shiprepair industry without further development of more open and participative styles of management. Industry is a joint venture, and in an ailing one like shiprepairing it is more essential than ever to ensure that everyone understands the problems and the reasons for the changes that have to be made in the interests of survival (Flack and Nichols 1980:38).

Returning from a visit to Japan, General Secretary Chalmers of the Boilermakers Society observed that consultation between management and workers could go a long way towards helping the U.K. shipbuilding industry match the severe competition from Japanese shipyards; We can beat the Japanese at their own game, but it has to involve greater motivation of our workforce (Fox 1980:2).

In U.S. shipbuilding, participatory management has taken the form of several variations on the quality circle theme. Norfolk Naval Shipyard was perhaps the first American shipyard to experiment with participatory management. The 9 quality circles initiated in 1979 were also among the very first in the federal government, and the Norfolk program has been serving as a model for other government agencies and private industries. In their second year of the program, Norfolk expanded the number of circles to 62. Perhaps more appropriately named than similar groups in other shipyards and industries, the Norfolk quality circles have in fact focused

primarily on quality rather than safety or productivity. Although Norfolk, like all the other U.S. shipyard programs, stresses that the payback has been realized most dramatically in the improved self image of the employees, a quantitative accounting has reported a 1:3.8 cost/benefit (Tweedale 1981:363). Other naval yards (Puget Sound, Philadelphia) have followed Norfolk's lead in installing quality circle programs (Bradley 1981).

The Sun Shipbuilding quality of work life program, initiated in 1980, also entailed "problem solving teams" involving 175 workers in three departments of the yard. An independent accounting of that program's activities by the yard's industrial engineering department identified over \$600,000 in savings in the first year (Lazes and Laird 1982).

Also begun in 1980, Lockheed's new work culture (they do not consider it to be a program in the sense of an experiment or application of specific techniques) has now 38 circles which are the main vehicle around which a much larger and more pervasive quality of work life environment has been formed. Eschewing traditional Japanese quality circle training in statistical techniques, Lockheed has oriented its circle activities in the direction of work planning. What is particularly unique to the Lockheed approach (cf. other U.S. shipbuilding participatory management programs) is the relationship of the quality circles to the remainder of the organization. They do not form a separate and parallel chain of authority and responsibility within the firm (there is no labor-management program steering committee), but constitute part of Lockheed's formal management structure. What is also unique in the Lockheed program is the effort put into the development of white collar circles. One-half of this yard's circles are constituted of office, rather than production, workers. Examples of quantified results of circle activity include: a painters and scalers circle which discovered deficiencies in sandblast material which upon rectification resulted in improved steel surfaces and a \$68,000 yearly savings in material costs; a pipefitters circle which redesigned the layout of their shop which translated into a 20 percent reduction in new construction pipe-fitting man-hours; and a welding circle which developed a new process to use weldable zinc primer — saving the yard several thousand man-hours per year (Hayes and Swanson 1981:94).

Another yard which has recently introduced a participatory management program is Bethlehem Steel at Sparrows Point. The Sparrows Point facility is the pilot shipbuilding project in that corporation's much wider effort in a number of industries. The first three employee involvement groups were formed in the spring of '82.

Quality of Work Life

Although there is no formal distinction between Quality of Work Life (QWL) and Quality Circle (QC) programs, QWL refers to a worker participation orientation which has a longer history in the United States, modeled more after shopfloor industrial democracy programs in Norwest Europe in the 60s and 70s.

QWL programs differ from QC techniques with regard to

1. extent of change effort — QC programs (especially the very basic multi-craft QC'S) may be very limited in the topics which they address.

2. action vs. problem-solving orientation — QC groups are essentially problem-solving entities, whereas QWL may involve experimentation with workforce organization, practices, and environment.
3. level of sanction — Innocuous QC programs may be initiated and may operate without highest level support of management and union leadership. QWL programs (because of their greater scope and range of action) almost always have top level sanction of management and organized labor.
4. reporting structure — QC programs may fit onto existing management structures with very little modification: Recommendations are made through the usual supervisory chain of command. QWL programs, on the other hand, generally make use of levels of joint labor-management steering committees, a parallel chain of command.

Worker participation activities are not static creatures, but are very definitely evolving processes. Depending upon specific conditions in an organization, one worker participation technique may be more appropriate than others. Depending upon the success of the initial venture, and the changing environment of the organization, it is possible to shift the effort to another level of involvement.

Discussion

Ben Scribner Before we move on, I'd like to talk a bit about the difference between QWL and quality circles. At Bethlehem we started out with QWL. We have never had a program that was limited to quality circles only. Everything we have done has been done under the umbrella of labor/ management participation. It began with our contract with the Steelworkers in 1980 in which provision was negotiated for experimentation with these techniques, and it was made part of the 1980 contract. The only difference in the 1983 contract is that the word experimentation has been struck. Worker participation is now part of the normal way of working at Bethlehem (steel division). I understand that the contract language for Bethlehem's shipbuilding division follows fairly closely the example set in steel.

I view quality circles as a principle element of QWL programs. Circles are the visible structure that allows for participation. QWL, on the other hand, refers to the process of participation. As Mike said, this requires commitment from the highest levels of management. Our chairman of the board has determined that Bethlehem will experience nothing less than a complete change in corporate culture — in the direction of participation. We are trying to find ways of involving every employee to the point where all feel as though they are owners of the corporation.

Bill Batt What is that you think you gain by achieving union cooperation?

Ben Scribner If management unilaterally establishes a quality of work life or quality circle program, then management can unilaterally shut them down. A joint labor/management program cannot be terminated at the whim of either party to the agreement. Both have to agree to abandon it, and this gives it staying power. An example is Johnstown plant where 2/3 of

the workforce are on layoff. A number of teams at that plant consists of members who are on temporary layoff, but who continue to come to the plant once a week to join in on the their quality circle teams. They are dealing with production problems, but they are also dealing with immediate problems of layoff, self-help programs, soup kitchens, gasoline money for laid-off circle members.

Mike Gaffney There are also other QWL programs that are designed so that they can be terminated unilaterally by either party to the agreement. This is to provide assurance to labor and management that are wary of the program.

Walt Amory Can you give me some tangible problems solved by your teams — not problems leading to other problems, but actual production problems?

Ben Scribner One plant making bolts was having problems with what they call *shorts*, rods from 6–8 feet in length, considerably shorter than the normal 24–30 foot lengths that the machines are designed to handle. Shorts can be processed, but they tend to jam up the machinery and lead to a lot of down time. The problem, therefore, was what to do about shorts. The employee involvement team came up with 18 different ways to deal with shorts, many of which were implemented. One of these solutions was to find out why they were getting shorts in the first place. For this the team made contact with another employee involvement team in the mill upstream that produced the rods. This latter organization never knew how much trouble the shorts were causing, and so changes were made at that end as well. Today, the problem of shorts is history.

Mike Gaffney This sounds very much like one element of the operation of small groups in Japanese shipbuilding. Members of the group have the responsibility to regularly check with similar groups both above and below them in the production process. The objective is to inform the group upstream of problems they are causing, and to check with the group downstream to see if they have any similar complaints.

Ben Scribner Sam Camens of the United Steelworkers likes to tell of one particular labor/management participation team at the Johnstown plant. They were having quality trouble with long bars of steel. These 4" x 4" billets were about 30 feet long and were inspected for defects on a runout table of equal length. Three of the four sides could be visually inspected immediately, and the fourth side was checked by tipping over the billet by means of a large bar. However, if the billets were at all bowed, the tipping-over process was very difficult and was occasionally ignored. Defects on the fourth side of such billets were not observed and passed further down the line. The employee involvement team quickly came to the cause of the problem because the workers had known about it for thirty years but could never get management to act on it. The runout table had a bow to it, and this was passed on to the hot billets. The problem was corrected, in this case, by the workers on the job directing the millwrights in the construction of a new runout table top using heavy plate that was surplus in the yard. It cost the company peanuts, but would have cost many thousands of dollars had they turned the problem over to the industrial engineering department for the normal treatment. Teams are encouraged to use their ingenuity and own resources whenever feasible.

Jay Leanse I would like to ask what involvement government has had in these programs. Has anyone raised any questions regarding the Fair Labor Standards Act or Workmen's Compensation Act? Has anyone suggested that the law requires that these people be paid for this work, or questioned their coverage for workmen's compensation?

Ben Scribner There have been some unusual events where the employee has been willing to forgo pay in the interest of participation, job security and the overall health of the company. In these cases the law department, driven by NLRB regulations, has insisted that the workers accept pay.

Peter Lazes Let me respond to Ball's earlier question asking about the advantages of involving the union. It has been my experience at Xerox that middle management is sometimes reluctant to speak up over an issue because they are afraid for their jobs. They do not have the protection of a union. The represented workers, however, are not afraid to point out the root production problems even though it may cause them some embarrassment. They have a union and the union is involved in the program. They are not afraid. Union involvement helps to insure that issues will not be ignored because people in this environment tend not to be fearful of losing their job.

Jay Leanse How are these people paid?

Gerry Swanson At Lockheed, we pay them straight time for their meetings, which is charged to overhead. I just want to add that we do have heavy involvement of unionized employees. We do not have any joint union/management oversight, however.

George Roper IV We've had circles that meet during their regular day and were charged against the job. We've had other circles that meet after hours with no compensation.

SOCIOTECHNICAL SYSTEMS, AUTONOMOUS WORK GROUPS, AND WORK REDESIGN

Daniel Denisen

Every organization has a sociotechnical system, whether they realize it or not! That's because each organization is made up of both social and technical resources and processes. The unique focus of sociotechnical systems theory emphasizes a simple point: the effectiveness of an organization results from a good fit between the social and technical resources. Skill levels of an organization's people must meet the technical demands, and the technical design of an organization must be one that plans for and incorporates an effective human organization — one that influences employees to be motivated, responsible, and developing, rather than unmotivated, irresponsible and alienated.

An overview of the sociotechnical systems perspective is part of this Workshop for several reasons:

1. It is one perspective on work improvement that has influenced the design of many organizations, both here and abroad.
2. It stresses both the social and the technical side of the organization and the importance of their being well-matched.
3. It has some similarities to the quality control circle concept, but extends that principle a great deal, and usually introduces several additional changes to an organization.

In practice, STS (Sociotechnical Systems) has led to a concern with how organizations design "work for their people," and has often led to the formation of work groups, at the shop-floor level, that have a much higher degree of autonomy and responsibility than is typical in most organizations. In many ways, these groups become self-managing, rather than "managed." The sociotechnical approach will be outlined here, contrasting it with a more traditional approach to designing work. STS will be compared to other worker participation concepts such as quality control circles and quality of work life. Examples will be given of STS applications in three different industries.

The Classical Approach to Work Design: Scientific Management

Most of the ideas used to design work and organizations, even today, come from a set of principles developed around the turn of the century. Scientific management is the term given to this perspective and it is probably best exemplified by the modern assembly line. Henry Ford didn't discover scientific management, but he did apply it. Some of the characteristics and assumptions that distinguish this approach include the following:

1. An attempt is made to simplify jobs to a series of elementary motions that can be learned easily and with a minimum level of skill and intelligence.

1. The technology of production ultimately determines the degree to which this can be done. If the technology allows for further simplification, it will occur.
1. Each operation is then studied to decide the best pattern of motion and to eliminate unnecessary effort.
1. Workers are motivated, as individuals, by economic incentives —if you want more, pay more; if you pay more, you get more.
1. Implicit assumption that management decides how work will be done, decisions that are then executed by workers. "Hands are hired, not brains."

This perspective on designing work and organizations has, of course, allowed for industrial production on a scale never before imagined. But it has also created a new set of problems that are now threats to the survival of organizations and must be addressed. Some of these problems are:

- The standardization required by such a system implies huge fixed costs, high break-even points and the fixed set of behaviors that go along with them.
- A rule, or new method of standardization, cannot be made for situations that have not yet been encountered. Flexibility is required to adapt to a changing organizational environment.
- This approach does not take account of what is known about the characteristics of a job that people react to favorably: variety, autonomy, feedback, a strong identification with task, and an opportunity to learn. These are all job characteristics that tend to improve productivity and the quality of work life.

Cast in the language of sociotechnical systems, it becomes fairly clear that the classical approach to the design of work and organizations tends, often at considerable cost, to overdetermine technically what employees should do on the job, rather than relying on the natural adaptability, willingness to learn and innovativeness of the work force.

Quality of Work Life, Quality Control Circles, Autonomous Work Groups, and Sociotechnical Systems: The Alphabet Soup of Worker Participation

A number of social technologies discussed as a part of this Workshop are reactions to the problems, outlined above, that stem from organizational systems designed from the scientific management approach and its many variations. How do they sort themselves out? Is a quality control circle an autonomous work group? Are both (or either) quality of work life? Can they be understood without spending five years getting a Ph.D.?

Many of these differences can best be understood by example. Let's suppose a quality of work life program starts in your organization and take form in two of the ways that are typical of such programs:

1. The program represents an effort to focus on those work improvements that stand a chance of improving both the involvement and satisfaction of the company's employees, and the productivity of the organization. Figure 3 represents this possibility, as well as some others.

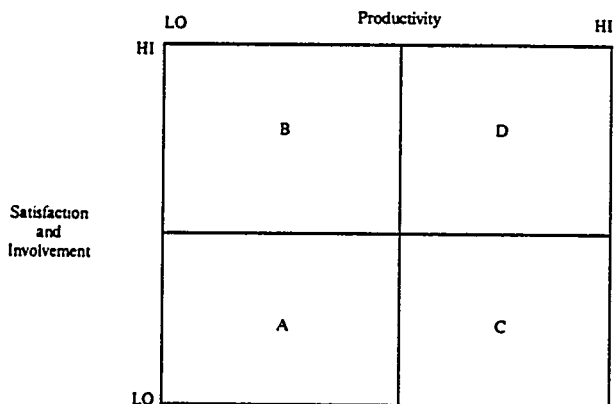


FIGURE 3

Satisfaction, Productivity and the Quality of Work Life

A in this diagram means *output of business*. Organizational changes that move the organization into this position are not in anyone's interest.

B might represent quality of work life, but not for long. Continued quality of work life means competing favorably and staying in business.

C doesn't represent quality of work life — productivity is achieved at the workers' expense and often leads to work slowdowns, strikes, or poor quality. "Speeding up the line" is a classic example of this sort of strategy — it might work, but not for long.

D focuses on those organizational changes that can improve both satisfaction and productivity. Quality of work life programs should focus here.

2. With a recognition of the importance of the above, a joint union-management quality of work life committee is formed, representing those areas of the organization that will be affected. Up to this point, nothing has *happened* except 1) an important change in attitude and 2) a planning and directing mechanism (the joint committee) that is representative.

The QWL joint labor-management committee now must decide what actions to take. After a period of *diagnosing* the organization's problems, they may decide upon an *intervention* — a planned organizational change intended to improve both employee involvement and productivity. There are many interventions to choose from — reward structure, flextime, job rotation and team building being among the many items on the menu. Suppose, however, that the QWL committee chooses to form quality control circles. The way that these circles will function has been addressed in the earlier papers and presentation and, rather elaborate this process, I will focus on the development and evolution of the Quality Control Circle

process and the relation between quality control circles and autonomous work groups.

Another example taken from a container corporation, will help to illustrate (*Lake 1983*). The Quality Container Corporation makes corrugated containers — cardboard boxes to the rest of us. When the cardboard comes off the line it goes onto a cart that is then used to transport the corrugated material to the point where it is cut and glued into boxes (*figure 4*).

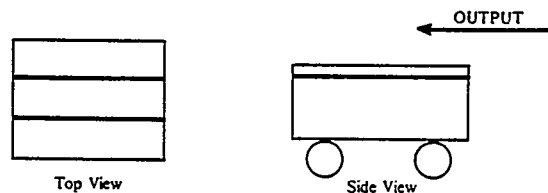


FIGURE 4

The Transport Cart

SOURCE: Dr. Dale Lake

The cart had a surface made of three slats — as noted in the figure. These slats produced waste. When taken off the cart, 5-10 percent of the cardboard looked like the drawing in Figure 5.



FIGURE 5

The Wasted Cardboard

One of the QC circles in this plant suggested that the surface of the carts should be recovered with metal to avoid this waste. They were, and the following results show that this project was quite a success:

	Savings	Expense
Estimated savings, 1 year	\$75,000	
Metal tops for carts		\$ 7,500
Cost of QC projects		\$50,000
	\$75,000	\$57,500

How do you think the members of the quality control circle reacted? Pleased? Encouraged? Rewarded? Their reaction to this, and not an atypical one, was indictment of the management; that is, if you're so smart (and so well paid) why didn't you think of this improvement? This reaction caused management to go on the defensive and threatened the continuation of the project. The project itself was preserved only because of the strong support of corporate management. This *secondary* impact of work improvement through employee involvement is a common occurrence and must be managed well if the benefits are to be derived.

This problem points out the key difference between QC circles and autonomous work groups: *Authority*. The QC circle is a designated problem-solving group, with the authority to make recommendations that are then subject to the approval of management. In an autonomous work group, the authority to make the change itself (and suffer or enjoy the

consequences) lies within the work group. A system of autonomous work groups tends to *delegate* greater authority to the group and also require greater responsibility — a group becomes more similar to a cost center or an independent business.

New Approaches: Examples of Sociotechnical Innovations

Many companies in the world today have made substantial efforts to take advantage of the benefits of using social technologies and small group principles to design work and organizations. In this final section, I would like to give three examples: one from the automotive industry; one from the container industry; and one from the airline industry.

The Saab-Scania Plant

How do you make an automobile engine? In Detroit, you build an assembly line with work stations where each operation takes approximately 30 seconds. Each work station is manned by an individual, usually working alone, who does a repetitive task. To *break even*, the line must run at a certain speed. Cutting production in half means slowing the line to an unprofitable speed. Increasing production, on the other hand, means cutting the time available for each operation — quality is likely to suffer.

Saab-Scania, on the other hand, builds an engine with a team of men (5-8) with overlapping and interchangeable skills. The team converges on the engine, which is built in a bay to which the necessary parts are funnelled. The number of man-minutes necessary to build an engine in this manner is roughly equivalent to the number needed on an assembly line. It is an excellent example of a situation in which both the social system and the technical system were considered when the factory was designed.

The Saab system offers several advantages that are worth noting. First, it is flexible — capacity can be increased by adding parallel units, or decreased by subtracting units without going below the breakeven point. Second, it takes into account human reactions to the workplace and creates a better working environment in the process. Third, it is extremely competitive, particularly in the relatively small market segment on which Saab focuses.

The Quality Container Corporation

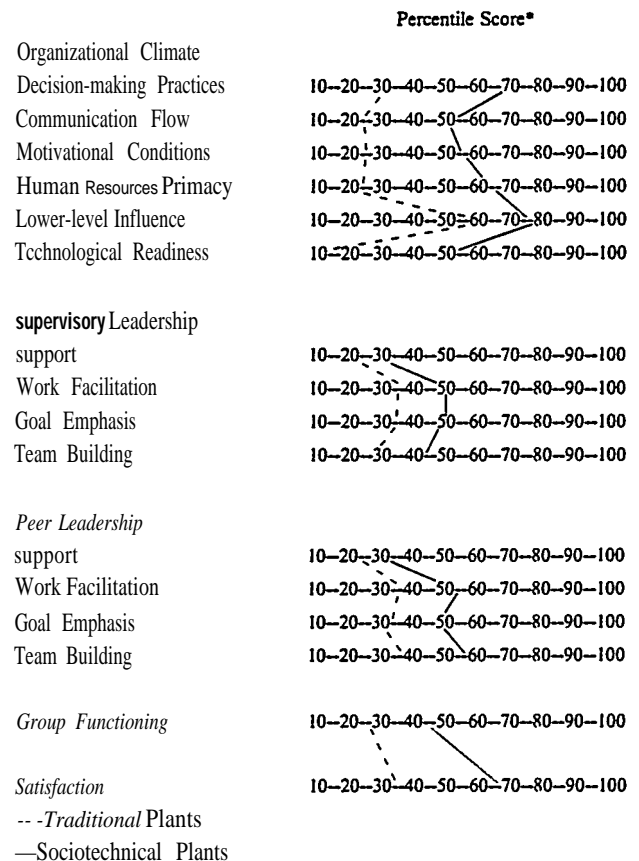
Deciding to form autonomous work groups, and granting these groups the responsibility to function in a relatively independent manner, is a big change for any organization. Does it mean that management is *losing control*?

In a 1982 paper I compare two sets of plants in one corporation — one set was designed and organized in a traditional manner, while in the other . . .

All workers in the experimental plants are trained in the STS concept of organization. This training emphasizes an entrepreneurial orientation toward their job and the organization. Once at work, they are paid a salary, not required to punch a time clock, not supervised directly, and not docked for days off. Each worker's salary level is determined by a pay scale based upon a training cycle. Peer approval is the criteria for advancement on the training cycle. An incentive system provides a group bonus for group performance, and work group members in the experimental plants have clear authority over hiring, discipline,

and discharge. A "lead man", often chosen by the group members themselves, coordinates the group and links the group to management (Denison 1982).

The chart provided in figure 6 shows the substantial differences in behavior and attitudes that occur between the two sets of plants. As you can see, the conditions in the STS plants were more favorable and these plants were generally more profitable.



*These percentile scores are derived by comparing the two sets of plants to a national sample of work groups from a number of other organizations.

FIGURE 6

Survey of Organizations. Percentile Scores for Major Indicators. Total Sample
SOURCE Denison (1982)

Figure 7 shows that the amount of control attributed to top management is more in the STS plants than in the traditional plants. Both workers and management appear to have gained in control — the gain for one did not represent a loss for the other. Both groups gained and the Quality Container Corporation appears to have developed a more tightly-knit organization in the process.

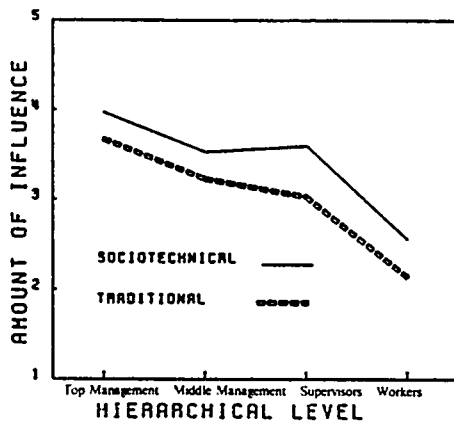


FIGURE 7
Control Graph, Supervisors and Workers
SOURCE: Denison (1982)

People Express Airlines

A particularly innovative approach to the design of work and organizations has been taken by People Express Airlines. Teams, rather than individuals, are used as the building blocks of the organization, and, wherever possible, these teams are *self-managing* — they require little or no direct supervision. Job rotation is employed wherever possible, so one team of individuals within the organization might be flight attendants one month, baggage handlers and ticket takers the next month, reservationists the next month, and doing staff work the month after that. This system of cross-utilization creates a set of highly motivated individuals for whom learning and opportunity are two of the greatest attractions of the job.

Within three broad skill groupings — Flight Manager, Maintenance Managers, and Customer Service Managers — cross-utilization and job rotation are practiced by most members of the organization. Flight Managers schedule, train, and administrate as well as fly airplanes. Maintenance Managers alternate between technical projects and day-to-day responses to problems that emerge. Customer Service Managers are formed into teams of three as they go through training and then remain with their team members as they cycle through in-flight, reservations, ground operations and staff work.

All members of the organization own stock, are part of a profit-sharing plan, and are paid a salary. These factors also contribute to having a group of people that are highly involved in their work and reach incredible levels of productivity. On top of this, many members of the airline come in on their days off to learn new jobs, begin staff work and so on. While there are some costs associated with this system (*i.e.*, lots of time spent learning and teaching, problems of coordination) it has, so far, proven to be a successful experiment in social technology.

I have focused on the application of the principles of sociotechnical design in a number of settings. This should illustrate that these techniques are relatively reliable ways to improve a human organization, and should have many potential applications within the shipbuilding industry.

Discussion

Jim Acton I may be the only nonconvert in this group because my yard does not have a quality circle program. So I will be devil's advocate. I've heard a number of very amazing success stories where management has essentially reorganized and redirected its thinking toward participatory management. What I have not heard, however, is a comparison between these companies and their counterparts — who are also reorganizing, but along more conventional (non-participatory) lines making use of a strong industrial engineering group whose charge is to accomplish the same things these worker groups have been doing elsewhere. Do we have such a comparison where major surgery has been done along similar lines but in a conventional management style? And just as an aside, if I had an industrial engineer in those shops you mentioned in your case studies, I would have fired him.

Dan Denison The answer is *no*. I wish that we did have such data, but unfortunately such comparisons or experiments are very rare. But I understand your argument that these problems could also be solved by the managers or industrial engineers doing their jobs correctly. The fact remains, however, that managers and industrial engineers don't always get the job done and that the workers can often help.

Bob Schaffran What about the auto industry. Isn't the fact that they are moving so strongly in this direction of worker participation evidence that it works?

Jim Acton But those changes have all been negotiated. I don't believe they had the opportunity to do these things in a more conventional manner.

We have seen evidence that these worker participation techniques have achieved results, but we need to know *why* it works if we are to sell the idea to management. We need to be able to show why improvements can be achieved better this way than through conventional techniques.

Howard Bunch Is there something antithetical between industrial engineering and worker participation?

Max Elden This is a very critical issue. It has to do with the relationship between technically trained people and socio-technical interventions. Some of the most competent socio-technical-based action researchers we have in Norway are graduate engineers who have received additional sociotechnical and social science training. The problem with IE's is that their basic training is in quite a different direction. Some additional training is necessary to overcome the gap. IE's and socio-technical systems professionals need not be at odds with each other. A sociotechnical analyst with IE competence is better than one without it — but the sociotechnical approach is more than IE.

You raise another issue as well, and I think that you are correct that most people in this room are *true believers* in worker participation. They agree that this is the way to go. There are probably very good reasons for this which have to do with organizational theory — but we haven't the time to explore this too deeply in this Workshop. I would just point out that for some organizations in certain environments a rigid, mechanical, bureaucratic structure is a very good thing. It gets the job done. In other types of organizations in other environments, it is less appropriate. The reason that there appears to be so much interest in worker participation in U.S. shipbuilding (and shipbuilding worldwide) at this point in

time. has something to do with the current circumstances of this industry: its present technology, and labor force in this economy. at this time.

Mike Gaffney I would add that tomorrow we will hear from Aubrey Daniels who will be speaking of a social technology that is not necessarily participatory, and in fact lends itself more readily to conventional, management-directed, programs. He will have a number of success stories as well. Unfortunately we do not have any controlled comparisons as a basis for judgement.

But related to this issue of industrial engineering and worker participation. I received a letter from a Professor De Sitter who is working with a Dutch shipyard on a program of worker participation and organizational change. He is a professor of industrial engineering at the Technical University at Eindhoven, the Netherlands. He gives a very good description of how industrial engineering techniques are being used in conjunction with a sociotechnical approach to change. They do not necessarily clash. Where they are most likely to clash is in the application of principles of scientific management. But industrial engineering isn't totally scientific management.

Dan Denison There is nothing to prevent IE principles from being used by a quality circle. They can hold a stopwatch too. If the determination of the most effective set of motions is critical to the functioning of an autonomous work group, they can (and should) get on with it.

Jim Acton Of the 26 divisions in the profession of industrial engineering, only one has to do with work measurement. I would like to make it clear that I referred to IE as only one type of engineering that probably has a contribution to make with regard to the revitalization of U.S. shipbuilding. I could have just as easily mentioned manufacturing engineering.

WORK REDESIGN IN SHIPBUILDING

Michael Gaffney

The introduction of participatory management, in itself, constitutes an organizational change; but such forms as quality circles and joint labor-management employee involvement steering committees lead to a sort of parallel structure to the principal formal hierarchy (in many instances to increase its effectiveness) (Davidson 1982:13). However, organizations have frequently gone further in modifying the structure of formal tasks, management systems, and reward systems along the same lines of decentralization and flexibility.

One element of the orienting philosophy of the Norwegian shipbuilding organizational development project is that

... (0)rganizational development processes have to be coordinated with other development processes within areas such as product, production technology, and production systems (Westhagen and Hotvedt 1980:14).

This highlights a difference between the earlier human relations approach to personnel development (tender loving care) and more recent socio-technical systems innovations, which are rooted firmly in technological and production realities.

In this respect, the Norwegian view is very similar to that of the Japanese. In that country, participatory management did not take the form only of occasional study groups, but rather was incorporated in a manner that supported changes in the larger organizational framework, the structure of shipbuilding work itself. In the Scandinavian yards, the change has consisted of a movement away from the traditional piece-work system (Westhagen and Hotvedt 1980:16) (Hill 1973:50). In Japanese shipbuilding, organizational change has taken the form of small rather than large groupings of workers.

Riesenfeld, in a survey of computer use in Japanese shipbuilding observed:

The workforce is well organized into small working groups which are autonomous in the labor division within each group. These are called multi-functional workers, and their experience indicates that these groups show increased productivity which results in better worker morale (1978, appendix 3:3-4).

This small group innovation may be viewed as an adaptation to product-oriented work breakdown structure production processes (zone construction, zone outfitting). Shinto, in his narrative of the progress of production techniques in Japanese shipbuilding, reports that:

The new system of production in Japanese yards did not find a complementary workforce organization in place. The workers were purposefully retrained and reorganized (1980:27). (T)eam organizations of the workers were suitably altered from functional control to zone control (1980:16).

Rather than moving individually all over a ship, workers under this arrangement remain together as a team working sequentially on similar modules in a particular workstation. The predominance of small group organization in Japanese yards is evidenced by a comparatively higher supervisory index (1.45 supervisors to 4.5 workers at IHI vs. 1:10.9 at Livingston) (Colton and Mikami 1980:70).

The concentration of individual worker attention to a specific workstation might seem at first glance to run counter to job enlargement practices which have accompanied the introduction of small groups in other manufacturing settings. In the case of shipbuilding, however, each task may consume a number of hours and gives the worker ample opportunity to exercise skill and discretion (Colton and Mikami 1980:56). Livingston reports that their experience with the small group/ workstation innovation (part of a technology transfer program with IHI and MarAd) has been . . . exceptionally well received by production personnel (Colton and Mikami 1980:54-55). This same U.S. yard has attempted to stabilize the membership of workstation teams by making permanent assignment of individual workers to specific supervisors (Colton and Mikami 1980:70). Although Livingston did not report that it experimented as well with participatory management at the time of introducing these organizational changes, it did state that:

In general, the features that characterize Japanese shipbuilding technology and make it uniquely different are philosophical in nature. It is a philosophy of management and control that works very well with a group-oriented and highly motivated workforce (1980:72).

The fact that participatory management frequently takes the form of small study groups, and that this also happens to be an important direction taken in terms of shipbuilding organizational change is not unconnected. The link has to do with the fact that people frequently do their best work in small assemblages, whether that work be head work (problem-solving), hand work (production) or some combination of the two. In Japanese shipbuilding, the small study group and the actual working crew have the same membership.

However, the principal relationship between participatory management and organizational change (which may take a number of forms depending upon specific social and technological conditions) is to be found in the ability of organizations designed around the principle of participation to respond more easily to change. Structural provisions for participation in decision-making provide a degree of organizational flexibility that is absent in companies that are structured along strict hierarchical and bureaucratic lines. Participatory organizations have more ears attuned to signals of the necessity for change, and are less susceptible to delays occasioned by the not-invented-here syndrome.

In the earlier discussion of problems and opportunities in U.S. shipbuilding, it was observed that the structure of work in American yards was found to be far more centralized, bureaucratic, and inflexible than in Scandinavian or Japanese yards. It is important to realize that the structure of the overseas yards is a rather recent innovation and not part of traditional Japanese or Scandinavian culture. Job diversification and multi-skilling in Japanese shipbuilding is explained by a shipyard personnel manager:

Between 1950 and 1963 we made revisions in the rules of job and authority seventeen times. Then, after 1963, we gave up the attempt to rigidly specify definitions over job and authority. In

ractice. we threw out rigid authority over jobs (Marsh and Mannari 1976:48-49).

Marsh and Marsh note that flexibility in Japanese shipbuilding also extends to managerial levels as well, especially in middle management ranks. Indicative of the change in emphasis is the elimination of the title section chief and substitution of the term team leader (1976:50).

The same researchers report that the shipyard they studied had also introduced some aspects of a matrix or task force type of organization; . . . with team leaders and workers brought together on a temporary basis to solve a particular problem or accomplish a particular job, after which they are disbanded (Marsh and Mannari 1976:50).

Shinto, in his description of the progress of production techniques in Japanese shipbuilding, reports that the change in workforce organization from functional to zone control:

. . . necessitated a drastic change in the combination of worker skills in each team. Workers were retrained so that they could manage to do multiple jobs or at least tack weld and gas cutting in addition to their proper jobs (1980:16).

The same trend toward greater flexibility and decentralization (continental style working practices) has earlier been reported for Scandinavia. Even in the U.K. where craft demarcation lines have been rigidly drawn, a number of yards have negotiated with their unions continental style working practices. And last year, the U.S. Penn-Texas Pennsylvania yard announced a contract in which the number of labor grades had been reduced from over 400 to approximately 80, with craft departments cut from 65 to 13. It is also reported that work rules have been completely eliminated at the yard.

It must be added, however, that simple reduction in the number of job classifications and elimination of work rules may be counterproductive unless the structure or organization of the workforce undergoes a complementary modification. If a functional breakdown, individual-oriented production structure remains, the reduction in labor grades and work rules may result in minimal (if any) productivity gains, or those that are only short-lived and followed by decreasing product quality, more accidents, and declining quality of work life (job satisfaction).

As might be expected, the much younger social technology projects in U.S. shipbuilding have not progressed so far as those of the Japanese or Europeans in this matter of organizational change. It would seem that these several programs have followed a very similar progression from early development of multi-craft problem-solving groups, to subsequent single-craft problem-solving groups, to self-managing action groups constituted of continually associated workers. The year-old employee involvement groups at Sparrows Point are multi-craft affairs, and Lockheed's first circles had membership mixes of various trades, professionals, and managers. But the Lockheed circles are now evolving toward a craft and supervisory orientation. The yard reports that these newer workgroup quality circles are beginning to pursue problems of a more complex and company-wide nature (Hayes and Swanson 1981:94). When this happens, quality of work life becomes no longer a one-hour-per-month activity (quality circle meeting), but is a 40-hour-per-week endeavor, which can lead to much more significant organizational changes and productivity gains.

Perhaps the best example of this progression is to be found in the Sun Shipbuilding social technology project. As a later experiment in that yard's quality of work life program, a group of production workers was given complete management

control over the construction of a main deck section module. The experiment allowed this fabrication group to do its own planning and production with supervision and specialist staff intervention only as requested. Besides introducing some production innovations of an engineering nature, the workers achieved efficiencies through inter-craft cooperation. The savings in man-hours over the construction record for an earlier identical module was in the order of 50 percent, and absenteeism dropped from 15 percent to less than 2 percent (Sun News 1982:5). The president of the union local said of this experiment

Before, management told you what job to do, when to do it, and how to do it. They didn't look to input from workers. E- 10 (the project deck module) was completed with very little input from supervisors, and inspectors told us it was the best quality work they could remember (Sun News }982:5).

Summary

The preceding studies, reports, news items, and comments, suggest strongly that participatory management and small group/ multi-skill worker organization has contributed substantially to productivity improvement in overseas shipbuilding. Results of three years of experimentation with, and tentative implementation of, similar innovations in American yards indicate that they might also work well in this country.

But in U.S. shipbuilding, and in other industries, one frequently hears caveats about transferring management styles and organizational forms from overseas, especially in the case of Japan, because of cultural differences. What is often overlooked, however, is that these practices are not part of the traditional heritage of these countries; they have been implemented and diffused as a result of purposeful introduction and successful tentative experimentation with social technologies. As has been shown for shipbuilding, participatory management and such organizational innovations as small production teams and multi-skill workers have very clear points of practical origin in the not-too-distant-past. Even the practice of lifetime employment has had a relatively short history in Japan. It developed as a solution to problems experienced by the large firms during the Meiji Restoration. The shipyards, in fact, served as the prototypes for emergent Japanese employment practices such as the permanent employment system (Dore 1973:380). And the conceptual origins of these practices is frequently to be found in Western, or even American, behavioral science. It is ironic to hear that there are voices in Japan critical of unreflective borrowing of European concepts of worker participation (Cole 1979:8).

A related view is that it is not these new techniques, but rather the underlying elements of social organization that result in high levels of performance (e.g., Japanese paternalism, company housing, participation in company activities, company identification). Marsh and Mannari's study found, however, that these distinctly Japanese social organizational variables have less causal impact on performance than do the more universal social organizational variables such as employee status in the company, job satisfaction, etc. Their conclusion is that performance in Japanese firms appears to have the same causal sources as in Western firms (1976:335).

But in rejecting the view that these overseas human resource practices are so culture-bound that they are not transferable to the U. S., the opposite error should not be made—that these

innovations were institutionalized overseas as isolated events. Industry management styles and organizational forms in Europe and Asia have indeed been altered in the direction of greater worker participation, small production groups, and organizational flexibility. But it has occurred by a process where theories and practices (whether of foreign or domestic origin) have been experimented with, modified, and melded into various social, political, economic, and technical environments. It did not occur by extracting, out of context from other nations or other industries, single elements of social technologies (quality circles, autonomous work groups, etc.). The degree and forms of worker participation in the United States will not take shape overnight, and will quite likely be easily distinguishable from those in Northwest Europe and from those in Japan. At the same time, the particular forms of work groups in U.S. shipbuilding may have more in common with shipbuilders abroad than they will resemble what is developing in the U.S. steel or automobile industries.

Discussion

Walt Amory I presume that zone construction requires series construction to be cost-effective.

Mike Gaffney That seems to be the major objection raised when someone proposes to move in this direction.

Jim Acton Zone construction is the utilization of group technology principles by combining various sub-assemblies that have similar sets of tasks and work content — even though they may look totally different. In other words, the units do not have to be identical at all, as long as they each represent, for example, work for five men of a certain craft mix for two weeks. This is the application of mass production techniques in a job shop environment. Mass (series) production is not a prerequisite. This is the secret of product work breakdown structure — break your project down so that these small work teams can do the work in virtually any location you choose in the yard.

John Roper I want to make the distinction between ship construction and ship repair. Ship construction entails large projects and a degree of repetitive work. Ship repair, by contrast, entails a lot of small jobs, with very little repetition. This characteristic of ship repair may require more flexibility with regard to the composition of workgroups. A ship repair gang is constantly in a state of flux. You need this flexibility. The small group concept may make sense for zone construction in shipbuilding, but it may be too rigid for ship repair.

WORKER PARTICIPATION IN SHIPBUILDING A Case Study

Peter Lazes

While the preceding sessions have consisted of generalized discussion of various forms of worker participation (with reference to examples in other industries or shipbuilding abroad), this session is intended to put some meat on the bones by focusing on a specific case study of worker participation in an American shipyard.

That yard is Sun Shipbuilding and Repair, which was sold in 1982 and is now Penn-Texas Shipbuilding. The activities that I will be describing took place in the two years just prior to that sale.

I want to preface this case study with a generalized observation which is based upon my experience at Sun Ship and other companies engaged in organizational change. It is clear that there is occurring a significant shift in emphasis or objective in these change projects — from job satisfaction, enrichment, and gratification in the 70s, to economic survival in the 80s. My view is that projects being initiated today should, from the very beginning, be prepared to deal with hard economic issues. Because these are the issues; job security is more important than job enrichment.

This shift of emphasis also took place at Sun Ship (albeit over a much shorter period of time), and that is the principal process I want to focus on in this case study — how to direct worker participation projects in shipbuilding toward addressing the most pressing economic issues facing the industry. The question to be asked as we review what took place at Sun Ship is this: is worker participation a strategy for economic development within American shipbuilding? If the answer is yes, as I believe it is, then we have to ask ourselves where we are going with other existing and planned worker participation activities. Should employee involvement groups be steered in these directions, or should they be allowed to pick their own research projects? And similarly, are shopfloor worker participation efforts (quality circles) sufficient in these difficult economic times? I'm not convinced that the shopfloor is the locus of the most important problems (or remedies). If we are talking about competitiveness, we are necessarily talking about market share, volume, economic viability, and new product development. These issues are not going to be solved on the shopfloor. Can they be addressed through worker participation techniques?

The Sun Ship worker participation project began with the formation of a joint labor-management committee headed-up on the union side by the president and the business agent of the Boilermakers (Local 802), and for management, the president and the vice president for yard operations. These four were the key people involved in the development of policy and guidelines for the initial problem-solving activities. And that is where the Sun Ship project started — with problem solving (quality circle) groups. The plan was to develop problem solving groups throughout the yard, beginning with one department.

A second-level steering group was set up in the initial department (eventually this parallel structure was established

in all the departments) which would allow for joint decision-making on the part of management and labor. These steering groups had oversight over the problem-solving groups in their respective departments.

The problem-solving groups themselves were constituted of a supervisor, a union representative, a union steward (if there was one in the area), and volunteers. The groups usually numbered eight (six workers and the management and union representatives). Sun called their small groups problem-solving groups rather than quality circles; 1) because the groups were part of a larger structure of labor-management cooperation (the two tiers of joint labor-management committees), 2) because they were rooted in specific departments (membership was not composed of individuals from all over the yard), and 3) because the supervisors were not automatically the group leaders (leaders were elected by the group).

Training for the participants consisted of 40 hours, half of which was on company time, half on the employees time. Training sessions took place between 1st and 2nd shifts. Trainer-coordinators drawn from the ranks of management and labor were used for this training, themselves having been trained for this purpose. In addition to the initial training of the problem-solving groups, the trainer-coordinators served as a resource for the groups, assisting them directly with their operation and providing a connection to the other resources available within the yard.

In 1980, at the start of the project, three teams were organized in each of four departments. In 1981, at the height of activity, 26 teams were in operation in eight departments.

There were boundaries to what problems or issues could be tackled by the problem-solving groups. Salaries, union grievances, contractual issues, benefits, etc., were not grist for the problem-solving team mill. Given these limits, the teams were permitted to set their own agendas (as I said earlier, an approach very much in tune with past practice in the 70s). Spending two or more hours per week (on company time), the problem-solving groups dealt with issues of product quality, work environment, safety, material handling, reduction of paperwork, reduction of scrap, rework, etc.

Some of the actual problems worked on include:

1. Design of a rig to allow a welding barrel to be handled by one man with no downtime. This task was a laborious and dangerous one that was handled only on the 2nd shift.
2. Handling of hazardous waste around shipways. The problem-solving group consulted OSHA standards and arrived at their own designated safety areas for the storage of hazardous material.
3. Hosing. The paintshop problem-solving group designed and built a steel construction to allow heavy equipment to move throughout the yard without damaging painting and welding hoses.

4. New paint equipment. One group conducted a survey of the painters to see how well they understood the operation of a new piece of painting equipment. This particular problem was chosen after a worker received a puncture wound from the new equipment (that resulted in 6 months of loss-time for that individual). As it turned out the painting department supervisors answered only 20 percent of the questions correctly, while the workers scored on average 87 percent — an indication that in this case the workers knew more about the problem than their immediate supervisors. With no published guidelines available on the operation of the machine, the group sought assistance from the manufacturers representative, and then passed on the information to others by means of an in-house seminar.

in 1980, the first year of problem-solving team activity at Sun Ship, over 30 problems were solved by 26 teams. 57 percent of the problems dealt with health and safety issues, 15 percent had to do with quality, and 23 percent concentrated on work flow. An assessment of the benefits of the project (conducted by the industrial engineering department at the yard) claimed a \$600,000 savings in that first year, at a cost of \$ 100,000 (consultant time plus the salaries of the trainer-coordinators) — a 6 I benefit/cost ratio.

In the second year of the program, there was a concern that the problem-solving teams were not dealing with the issues that were most pressing. The problem-solving groups were doing fine in solving discreet problems, but what was really needed was an effort directed at improving the efficiency of the production process as a whole. At the recommendation of the trainer-coordinators (two full-time, and six part-time), and with the agreement of the president of the yard and the president of Local 802, it was decided that an experiment should be conducted making use of combined crafts and autonomous work groups in the production of a substantial piece of work.

After a period of preparation and training (training in blueprint reading, sequencing, work flow budgets), several of the fabrication department problem-solving teams were given responsibility for the planning and construction of a 105 ton deck-section module. They were given the blueprints and told to get on with it in the most efficient manner they wished. The role of supervision/ management was to provide the teams with equipment, material, and guidance as requested.

An earlier deck section, was budgeted at 4,511 hours and completed in 5,346. The experimental work group section was also budgeted for 4,511 hours, but was completed in 3,317. The two sections were not identical, but quite similar for purposes of comparison. The work was done in the same fabrication shop using the same tools and many of the same workers. The 3,317 hours also included the time spent preparing for the experiment (planning, training, and group meetings), and for similar meetings during the period of construction (they met twice a week to schedule their work, deciding what crafts would be needed and when). A similar savings in manhours was achieved by the welding department which was budgeted at 4,391 hours, and actually spent 2,639. It is also noteworthy that there were no blue lines (rework) on the experimental deck module, where normally there would be two to three rework sessions. Additionally, absenteeism in the fabrication shop went from 15 to 2 percent. And all these improvement figures were calculated by the

industrial engineering department at the yard, not by the experimental work groups themselves.

What I have attempted to illustrate by the Sun Ship case study is that worker participation activities can address the most pressing economic issues. Let me give you another example from Xerox Corporation.

The continuation of one division of Xerox was threatened by the fact that its product could be farmed out to overseas suppliers at a substantially reduced price. The division had already in place problem-solving groups which convinced management and labor to establish a task group to work on the problem in an effort to beat the price being offered by their external competitors. The joint labor-management task group was formed and recommended innovations that would result in a savings of 3.5-3.7 million dollars annually (they had only to demonstrate a 3.2 million dollar savings to keep the jobs within the corporation. The changes included overhead economies, job classification amendments (permitting equipment operators to maintain their own machines). These changes have been put in place and the entire 180 man workforce has been retained.

The Xerox example illustrates how worker participation structures can serve to retain work and jobs that are already in place by improving production economies of existing products. But it is also important to make use of these techniques in the creation of new product lines and new jobs within industries. Perhaps the best known example of this is the Lucas Aerospace Corporation in the U.K. Faced with a decline in sales of defense-related products, the workers of Lucas made use of the assistance of a nearby technical university in development of non-defense products that were economically manufactured using the same workforce skills, machinery, and facilities.

The linkage between shopfloor worker participation activities, and the sort of new product development initiatives so briefly described here is this — that turning over more management responsibilities to workers closer to the job not only improves the chances of more efficient production, it also frees up higher levels of management to deal with such important issues as product development. As an example of this process, let me offer one last example, Toyota.

Toyota identifies 2000 warranty problems annually. They have an interesting way of handling them. 200 of the most difficult problems are turned over to their engineers for design improvements. The remaining 1800 (or 90 percent) are given to the quality circles to address. This allows both management and the engineers sufficient time to address the larger technical and strategic issues facing the corporation. By way of contrast, GM handles its warranty problems differently. All of them (100 percent) are given to the engineering department to solve.

Discussion

Howard Bunch The numbers you have shown us are absolutely incredible: a 40 percent manhour savings on the first unit after reorganization along the lines of autonomous work groups. Does that number surprise you, George?

George Roper No, because I just completed an overhaul of two LSTs using a similar technique, and I believe my figures might even be better than 40 percent.

Jim Acton Howard, I'm not startled at this figure. If we could get the workforce to address the problems in the shipyards that we all know about, savings of 40 percent are not at all surprising. The fact that it was done in this particular way speaks well for the method of worker participation. But I would guess that if you analyzed the actions that they took, they would be the same actions that many of us have been trying to change for years. The fact that they were allowed to be implemented is the amazing thing, not the 40 percent.

Peter Lazes This is an important point. Nobody is claiming that the content of change, the specific innovations that the autonomous work group came up with, are all that sophisticated. Jim is correct in pointing out that what is new is the process of change, the manner in which they were allowed to be tried out and then examined in terms of their appropriateness. That is the principal contribution of worker participation techniques. It is not the case that our engineers don't know the answers and therefore have to turn to the hourly workers for solutions; it is that traditional organizations of work do not lend themselves very well to adaptation and change. That is where this process of worker participation becomes so important. In fact, even this process is not entirely new. Two thousand labor-management groups were formed during World War II to deal with the issue of productivity.

Jack Garvey It is interesting that this number, 35-40 percent keeps coming up. The industrial engineers at Bethlehem Steel, Sparrows Point got a 40 percent manhour savings by concentrating their attention on a specific problem. Bath and Avondale have come up with a 40 percent savings through the introduction of zone construction. So here are cases of engineering and planning activities both coming up with 40 percent improvements. Now we have an example of turning over more responsibility to the workforce and coming up with 40 percent. I don't discredit Peter's number at all; I think they represent very real savings of that magnitude. But I do think that there are other savings that have to be teased out as well.

Gene Chambliss How can you be sure there has been no fudging of those numbers?

Peter Lazes The manhours were carefully tracked by the vice-president for operations and by the union. The workers were clocked in every shift on this project. And as I mentioned, it was the industrial engineering department that calculated the cost-benefit figures.

Ande Abbott I've had some experience with fabrication and there is a learning curve that operates between the constructions of similar sections. especially when some of the jigs constructed for the first section can be used on succeeding units. How important a contribution did this make to the manhour reductions in the experiment?

Peter Lazes With regard to the contribution of the learning curve I can't say. But with regard to the jigs, the deck sections were not sufficiently similar to allow for much multiple use of jigs.

Jim Acton Did you establish a feedback system that would have allowed these lessons learned by the experimental group to be passed on to other workers in the event that the project had been continued?

Peter Lazes Thorough communication played a critical role. As work was completed, the actual progress of the mid-section was posted on large blackboards so that everybody in the

fabrication area had access to information of the progress of the work. Training was also provided in multiple-skilling, budgeting, work flow, sequencing of work, and blueprint reading. This enabled other workers to learn these critical skills.

Unidentified On the operation of the earlier problem-solving teams, what happens when a team solves a problem? What is management's reaction?

Peter Lazes I may have given you the impression that the team is completely on their own with regard to problem selection. That isn't true. Departmental steering committees keep in very close contact with the problem-solving teams in their respective departments. The teams do not work in a vacuum; they get continuous feedback from various levels of management and union representation. There were no surprises. So it is unlikely that a solution would be rejected. But it can happen, and when it does, it is essential that the problem be directed right back to the team again, with very detailed reasons from management why they are rejecting the group's solution (lack of capital, unavailability of cranes, etc.). The team-management feedback loop at Sun was such that no solution was ever rejected in the two year history of the project.

Unidentified How was this informal tracking by management accomplished? Did management attend the team meetings, or did the team attend advisory committee meetings?

Peter Lazes Both. At regularly scheduled departmental advisory committee meetings, representatives of the teams reported on the progress of their groups. We also had members of the advisory groups occasionally sit in on the team sessions.

George Roper And who sits on that department advisory committee?

Peter Lazes The superintendent, department head, and two union people (two shop stewards or one steward and a union **be**

George Roper Did they get training too?

Peter Lazes Yes, 20 hours. They had to know how problem-solving teams worked, the various tools the teams might use, and they also had to know how to coach the teams.

Unidentified Could the teams make any decisions to implement without first getting permission from management?

Peter Lazes No. They had to check with the advisory group to see if their solution would infringe the union contract, or interfere with what another team was doing, etc. These advisory committee checks are very necessary so this process can be focused and controlled. There has to be provisions for monitoring and accountability.

EMPLOYEE-MANAGED WORK REDESIGN

New Quality of Work Life Developments from Norway

Max Elden

A worker and a manager in a Norwegian factory were being interviewed by a journalist about the company's well known and highly effective new organization design based on self-managing work groups. The worker had been selected because management saw him as having done an about-face in his attitudes as a result of the new work organization. When asked by the manager why he had changed from a highly negative to a highly positive attitude, the worker seemed perplexed. "I haven't changed," he said. "Before, we were always told what to do. Now, we make most of the decisions ourselves. All along, I've been telling you and the other managers that this is how it should be done."

Later, the manager reflected over this. "Maybe he is right. Maybe he hasn't changed. Maybe it is we managers who have changed. Maybe we have started to listen."

This story is not limited to Norway. I've been hearing similar stories about managers in Europe and Japan and even more recently in America. The best American story comes from Chrysler's dynamic president Lee Iacocca.

An interviewer recently asked him his view of new developments in management. Iacocca responded that when he had been a plant manager at Ford, he had made it his business to get to know the workers personally. He felt he could talk to them about their families, their personal lives, and other such things. In reflecting on how it was different today he said, "You know I never thought to ask them about their jobs. It never occurred to me that they might have any ideas about improving their workplaces." Around the world today, managers are starting to listen to workers. And it is paying off.

I want to tell you about a new do-it-yourself approach to QWL research and change based on listening to workers. We started to develop this approach in Norway over 10 years ago. Some of you might have heard of the original QWL research work done in Norway about 20 years ago where the idea of self-managing work teams was experimented with on a national basis for the first time. Many of these same innovations are now being used in America in such leading corporations as Procter and Gamble, Xerox, General Motors, and others.

The new message from Norway is that no particular QWL innovation is necessarily the right one. Such innovative organizational forms as self-managing teams, quality control circles, or problem-solving groups are not as important as employee participation in the change process itself. Therefore, in many cases today employees are being authorized and trained to study and change their own work place. After all, who knows a work place better? Our studies in Norway show that workers are consistently better than outsiders (both managers and so-called change-experts in analyzing and solving their own organizational problems. When properly prepared, workers seem to be their own best consultants.

In the early 60s, Norwegian work researchers were asked by a national commission composed of representatives from trade

unions, employers, and the government to study alternative approaches to enhancing and democratizing working life. The first four field experiments were described in a book (Norwegian) in 1969 which caused quite a stir in Scandinavia and led to many new innovative organizational changes. Probably the best known are the new factory designs at Volvo which some see as having eliminated the assembly line. You might recall the Volvo ads from the mid 1970s about how groups of workers built better cars than workers chained to an assembly line.

At this state, QWL improvements were installed by experts. While Norwegian researchers were satisfied with the scientific results of these field experiments, they were less than happy with the failure of the results to spread to other companies or even to other units in the same company. But in one of the more successful Norwegian experiments where the workers took over the process of analysis and change, the process did spread. In this case the workers had not only learned how to work in a new, more self-managed form of organization, but they had also learned how to redesign and change their own organization. This helped us to see how important it was to make the change process participatory — rather than researcher or consultant-managed. We call this new approach worker-managed or participative research and change.

In participative research, those to be affected by a QWL improvement project have as much say as the researcher in each step of the research process. Indeed, in more advanced cases, workers analyze their own work place largely on their own. Thus, participative research means worker-managed inquiry. Workers define the issues to be studied, gather data, develop a framework for analyzing it, and draw conclusions. They define their own reality. This is not as implausible as it might seem at first if two things are kept in mind.

First, workers possess a great deal of practical and quite specific, although fragmentary, impressions, perceptions, and reactions to their work places over time. They experience the total situation and therefore have data on how different work environment factors can operate in concert. They have systemic, historical, insider's knowledge. The task now is to uncover this data and systematize it into actionable knowledge. This is usually performed by those same types of specially trained experts (researchers, consultants, change agents, and the like), who in the 1960s dominated the research and change process. Now their role is far more limited.

Second, research can be defined as a form of learning that follows certain scientific rules of inquiry. Since these rules must be based on theory and data that follow a consistent logic and produce disconfirmable results, some initial contact with a trained researcher may be helpful, but there is nothing in the scientific method that limits its use to those with advanced degrees. So my relation to a group of workers doing their own self-study is often similar to my relationship to a student completing a term project. I provide advice and guidance but I

don't do the research work. And workers tend to have an advantage over students: they know firsthand what work is all about.

Perspective is crucial

Even though research can be seen as a special form of learning, it still makes a big difference who applies the rules. The determining factor is whose definition of the situation dominates: who defines social reality? Is a worker's definition of QWL problems and solutions the same as management's? If not, whose is better? Why? These are critical but often unasked questions in QWL programs.

Just how important these questions are was demonstrated in one of the first efforts to apply the participative implementation strategy of Norway's Working Environment Law. A shipbuilding concern appointed a team of in-house technical experts to study and recommend QWL improvements in a selected department. The team went through the forty-hour QWL training course and used standardized checklists and other guides from the course to complete its study. Workers in the selected departments did not participate. While no one actually disputed the findings, they did not lead to any change, and the management considered the project a failure. But it did not give in.

The management appointed a new team composed entirely of workers from the same department. The new team went through the same training as the old team and used the same analytical aids to study the same organizational unit. The only difference was that workers were analyzing their own work place. Despite the similarities in each group's study plan, they saw problems differently and assigned different causes to problems.

The experts attributed 100 percent of these problems to technical causes while the workers attributed them in about equal measure to technical and organizational factors.

The company's technical experts did not see organization as causing any problems in any of the three categories.

These findings are consistent with other research showing systematic perceptual distortion even between individuals on adjacent levels within a single organizational unit. Studies of superior-subordinate relations, for example, find striking differences in perceptions of problems.

These differences are important because different definitions of problems mean different ideas about solutions. The solution depends on the definition of the problem. Thus, in the shipbuilding company, the failure of technical experts to see organizational causes of problems would lead to quite different solution strategies than those developed by the workers in that situation.

How one defines and explains a situation constitutes a theory of the situation. The primary task of participative research (and what differentiates it from the work of problem-solving groups) is to develop the most simple, straight forward cause-and-effect explanation of a work place that makes sense to the people who work there. We call this kind of explanation a local theory. It can be developed only through a process in which workers' language, their way of thinking, and their experience is used to generate a framework for systematizing their individual understandings into a collective explanation that can serve as a basis for action.

As has been noted, workers have large amounts of raw data about their own work places. But the data need to be systematically collected and analyzed. On an individual basis, it is fragmented, personalized, and incomplete. Each indi-

vidual makes as much sense of the data he or she has, but without some programmatic effort, these individual understandings remain isolated and incomplete. Helping workers to overcome this pluralistic ignorance by developing their own local theory is the essence of participative research.

Moreover in our experience, this process of participative research usually leads quite naturally to participative design and change. When workers get insight and understanding by producing it themselves, they naturally want to apply what they have learned. Producing new knowledge as any researcher knows is exciting stuff. Some of us have been lucky enough to produce new knowledge that is actually used, but this tends not to occur often. The most exciting professional work I have done, recently, is to work with people who produce and then use their knowledge. I learn a lot but the participants also learn: we co-produce learning for change.

Invariably, the local theory produced by employees is richer and more complex than any theory produced by experts. Often it is a more complete and useful guide to making appropriate changes than management's ungrounded, but well-intended, ideas for QWL improvement.

Let me describe an early systematic attempt to develop a worker-managed QWL study and change process. We chose a bank which was interested in testing out the new organizational ideas we had developed in industrial settings. If we could develop a more employee-managed change process in such a tradition-bound, closely regulated, hierarchical organization, then we felt we would have something that could be applied in many other types of organizations. It turned out to be a difficult job that lasted several years.

One way to tell you the story of the bank project is to describe a series of crises through which all participants — researchers, managers, workers, and union representatives — learned how to share power and responsibility. Initially this occurred for the purpose of organizational self study and change. Later on the same model received increased collaboration and was developed within the day-today work of the bank. The three main crises were (1) getting workers to accept the challenge of managing (or in the beginning at least co-managing) the research process, (2) determining whose definitions would be used to analyze the data and write the report, and (3) developing enough trust between managers and employees to use the report as a basis of change guided by a change team elected by all employees (including labor and management).

We survived these crises and the findings of the research became the basis for a long term, employee-managed change process. Specific findings and results were published in research reports written in part by employees. We have also developed various techniques to further organizational analysis, redesign, and continuous learning through participant-managed processes.

Although we feel confident that this approach has a high potential it has not been free of problems. The three most important problems we have encountered so far are:

1. The rich get richer — One of the main ideas behind participative research is to assist relatively disadvantaged stakeholders to participate more effectively in decision-making that affects them. The problem is, that so far, most participative research efforts have taken place in relatively well-off firms which have become better off. These efforts however are among the first ones as this approach is still in the early stages

of development. More recent efforts among less well off stakeholders (e.g., weak, poorly organized trade unions) have shown that the participative approach can work as originally intended.

2. The junta problem — In all but the smallest organizations worker-managed inquiry usually means that a select few workers actually conduct the study and manage the change process. Care must be taken to make selection of these participants as open and regular as possible to keep these representatives accountable, and to involve all workers at certain times (e.g., regular town hall meetings, worker councils, etc.).
3. The surrender problem — change agents, other process experts, and managers need to develop new more collaborative roles which share power and decision-making in QWL projects and redesign. Once such role as co-learner has been developed, the change agent can more readily depart from the scene.

The main task is to involve workers who have first-hand knowledge of their own work places in determining the content, direction, and speed of QWL improvements. Our studies show that this kind of participation releases large amounts of otherwise untapped human resources. The problem seems to be that management has the authority, but not the knowledge, to make the most effective changes while workers have the knowledge, but not the authority. One way of solving this problem is to give workers their own work redesign on a regular basis. With proper managerial and organizational support, workers can become the company's best QWL consultants.

BEHAVIOR MODIFICATION

Performance Management

Aubrey Daniels

Performance Management, a specific application of principles of organizational behavior modification, is a systematic, data-oriented approach to managing people at work. Its essential elements are: (1) measurement, (2) feedback and (3) positive reinforcement.

Measurement is the collection of data on employee performance. It is used to establish a baseline — or starting point — and to determine progress and improvement.

Feedback is the process of sharing the collected performance data with the performers on a regular, frequent basis so that they can monitor their own individual progress.

Positive reinforcement is the appropriate recognition of performance improvement or of behavior that leads to improvement. Reinforcement may be intangible or tangible, scheduled or unscheduled; however, it must be specific to the performance improvement, not general, such as “Keep up the good work, Joe.”

The key to successful application of Performance Management is combining these three elements in a systematic, continuing program.

Performance Management is deceptively simple. Many managers, upon hearing it described for the first time, either dismiss it as being “too simple to really work,” or say they have been doing it for years. The first of those two arguments is easy to refute: thousands of managers are proving daily that it does work — often dramatically — to improve quality and productivity. The second is more difficult to counter because the manager who says he has been doing Performance Management may, in fact, be using one or more of the elements to some degree, although not in the right way, at the right time or in the right combination.

For example, a manager might receive monthly computer printouts of production figures and might even share the information with his employees. This, to be sure, is measurement and feedback — but not in the Performance Management sense. Data in that form are usually too general or too late to have any appreciable effect on daily, individual performance. Other managers think that being a nice guy is using positive reinforcement. In fact, just the opposite might be the case. A manager who plays the nice guy role at the wrong time maybe inadvertently reinforcing undesirable behavior.

To illustrate the effects of measurement, feedback and positive reinforcement, let us consider the sport of bowling. This is a physically demanding activity that involves lifting a heavy ball and rolling it down a lane to knock down pins. It's fun and it's challenging. The number of pins knocked down is the bowler's measure of performance. Recorded and posted scores give him continuous feedback on how well he is doing. When the bowler rolls a strike or completes a high-scoring game, he receives pats on the back from his friends. If he is bowling in competition, he may win a trophy or prizes.

But, suppose a screen were placed in front of the pins with just enough room at the bottom for the ball to go under. The bowler could not see the pins fall. Neither he nor anyone else would know his score. Even if he bowled a perfect 300, he

would get no accolades. Bowling would then be work not sport; drudgery, not fun. In short, bowling would be quite different without measurement, feedback and positive reinforcement.

By introducing measurement, feedback and positive reinforcement to the work environment, Performance Management can make work as challenging, stimulating and enjoyable as bowling. When these elements are introduced into a plant or office where they have not existed previously, the effects on the workers can be as dramatic — in the opposite way — as the effects on bowlers suddenly confronted with a screened lane. Complete change of attitude and sharp increases in productivity are commonplace.

Performance Management is not a collection of motivational-gimmicks or platitudes. It is based upon immutable laws of human behavior and supported by more than 30 years of experimental and applied research in laboratories, schools, universities, clinics, hospitals and — since the early 1970s — business and industry. Much of this research examined human behavior on the basis of the theories of the eminent American psychologist, B.F. Skinner.

Dr. Skinner rejects the belief that to influence an individual you must first understand his innermost needs and drives. This view, still widely held, implies that a manager who has a problem with an employee can't take any immediate, direct action. He must first uncover the employee's deep-rooted anxieties and motives and then understand them in relationship to himself as some type of an authority, or possibly even a father figure. This has caused many managers to think that they must try to play psychologist and pry into the private thoughts and lives of their employees.

In spite of all its appeal to managers, the view simply isn't valid. Most of the managers' insights never lead to increases in production or decreases in costs. Managers using that approach do not increase the job satisfaction of their subordinates, but they may very well increase their own. They may enjoy the power of playing shrink with their employees. But does this serve the mission of the company?

A manager does not need to be a student of human behavior to understand Performance Management. Regardless of their educational level, all supervisors and managers can learn to practice it. From hourly workers to company presidents, more than 25,000 individuals in work settings have been taught its easily assimilated principles.

Performance Management is the best approach to managing contemporary employees. Since the Industrial Revolution, when management really came into its own, managers have applied one of two models to their work: the military model or the sports model. In the military model the manager sees himself as a military officer and his employees as his troops. This relationship implies that the manager gives orders and his subordinates obey them. Such a style is inappropriate to today's work force.

The sports model is no more successful. In this framework, the manager regards himself as the captain or coach of the

team consisting of his employees. He relies on pep talks, exhortations and humiliation to motivate his people. He is not particularly successful with today's employee, who may like sports, but who considers himself an individual with special needs.

Performance Management requires managers to individualize what they do. What one person likes and wants as a positive reinforcer or understands as feedback may be different from what others like or understand. Managers must provide explanations for what they ask workers to do. Specific descriptions of desired performance must be given. Managers must show people data on their performance and set reasonable goals based on the data. Managers can meet their own goals only by showing and telling people that what they are doing and producing is genuinely appreciated.

Performance Management was not invented as something new to be tried. It is derived from documented laws of human behavior that are not optional for any particular manager or individual. It is not simply common sense. For years people thought the Earth was flat. Science showed us that it was not. For years people believed that the Earth was the center of the universe and everything revolved around it. Science said no. For years people also thought that behavior was unpredictable. Today we know that behavior conforms to certain laws and is predictable.

Many managers are concerned that people are not the same as they used to be. But the rules that govern what people do today are the same ones that have governed behavior from the beginning of time. People have been unsuccessful in solving personal and work problems with other people primarily because they have been disregarding the laws of behavior. The laws themselves have not changed.

Performance Management is nothing more than applying the laws of human behavior to the work setting. It isn't necessary for a manager to know how or why these laws work — or even exactly what they are. It is sufficient to know that they do work, and that following certain procedures will produce consistent, predictable results.

Discussion

Ande Abbott Back in the 60s, there was a term employed to describe what I think you are talking about — transactional analysis.

Aubrey Daniels No. The thing that has been confusing to a lot of people is that they talked about strokes. You remember hearing about stroking? But that stroking does not imply a contingent relationship. You see, it's not enough for managers to be nice to their workers, to go around patting them on the back. Performance management entails giving those strokes only when they have been earned by appropriate behavior. Another difference is that transactional analysis is derived from Freudian concepts, whereas performance management is based upon empirical data.

Mike Gaffney Aubrey, isn't it true that one of the sources of positive reinforcement for a quality circle is not the management presentation that may be 12-18 months down the road, but rather lies in the continuing process itself. The individuals working in a small group, whether it be a problem-solving group or an autonomous work group, are (in fact) reinforcing each other's appropriate behaviors many times throughout each working day?

Aubrey Daniels Well, maybe. But you see, you can't count on that. It may be sufficient to fuel the program for a while. everybody being excited about the fact that they are now making decisions, things they couldn't do before. But over a period of time, they can satiate on that. In other words, if they are making decisions about the way they are doing their work, and management never acknowledges that — management never reinforces them in any way, you can expect that you are going to have a deterioration over time. This can be gauged by the number of meetings they hold, the number of volunteers, etc. Initially there is a lot of reinforcement for doing new things. If you want people to be proud, in the long run, you've got to be proud of them first. A worker can get a degree of satisfaction from knowing he has done a good job, even if nobody else sees it, only if he can associate this back with a not-too-distant experience when a similar good performance was the occasion for praise on the part of his supervisor. So don't count on the process being sufficient for carrying these programs forever.

Mike Gaffney I don't dispute that it is important for group-focused social technology programs (quality circles and the like) to receive positive reinforcement from management as often as possible. My point is that one of the advantages of group processes is precisely that it puts in place a structure which allows for continuous positive reinforcement by peers.

And not only may this provide more effective reinforcement than that given one-on-one by individual supervisors, it may also be much cheaper. A workforce that is structured to positively reinforce each other on a continuing basis may be cheaper than a system which requires many managers whose job it is to go around giving strokes to individual workers.

Aubrey Daniels That's correct. If you have a five thousand man workforce appropriately structured, those are 5000 potential sources of positive reinforcement. One of the things that my company does in a structure that we call performance teams (another version of quality circles) is that we teach everybody what management has learned about positive reinforcement. We teach them to reinforce each other, and also to reinforce those people that their team will have to deal with. If, in fact, we don't have everybody involved in the process, one of the first things we get them to deal with is how to make what the team is doing reinforcing to the people outside their immediate circle. They have to plan a strategy within these performance teams to insure that people outside their groups will be reinforced for implementing plans that they come up with.

So you are absolutely right, Mike. There is no way that management can provide all the necessary reinforcement. So you have to have a system that will facilitate that, and that is where a group strategy helps. It brings everybody into the process.

Howard Bunch I've been told by people who are apparently authorities in this field, that behavior modification programs are antithetical to worker participation programs — that you can't have one with the other.

Aubrey Daniels My firm has helped many companies around the country implement programs that contain both elements. We see worker participation as Phase 2. Phase 1, performance management, is preparing the environment. So we begin by training managers to manage people by means of positive reinforcement, increasing the amount of feedback they get on their performance and then once we have that established, and we have some good results, then we start to involve the

workforce. Then we teach them the same sort of information we taught management. I don't know what data suggests that the two approaches are incompatible, but I have some data of my own that suggest otherwise.

Ben Scribner The message I received from your presentation is the following In a behavior change process, there needs to be continuous positive reinforcement of good behavior. The only way to do this effectively is to have it built into the system. The way to do that is to institutionalize the positive reinforcement process. Now, to me that sounds very much like the underlying logic of programmed learning. Programmed learning was supposed to be an improvement because there was continuous positive reinforcement — reward on every page. Yet, programmed learning is the lousiest way to learn I ever experienced, and it failed. Please explain.

Aubrey Daniels Yes, and it failed because there was no positive reinforcement in it. In putting those texts together, the authors made the same mistake that management makes. It is naive to think that a message coming up on the screen saying, good job is going to reinforce everybody. I agree with you. Most programmed texts have never been read, because it is the dumbest way to learn that was ever invented. But if I had consequences that were meaningful to you in that system, then it would work. The trick is to find out what rewards the employees will respond to.

John Roper I'd like to know what your view is of intrinsic vs. monetary reinforcement.

Aubrey Daniels Intrinsic reinforcement grows out of extrinsic reinforcement. I call it social and tangible reinforcement. Social reinforcement, and that is what goes on between two people, is your mainstay — because you don't have a budget. It doesn't cost you anything to dispense social reinforcement. At some point, this social reinforcement translates into something tangible, a pin, an award, some cash, etc. that is evidence that reinforcement has taken place. But there has to be a link between tangible and social reinforcements to make them effective.

SUPPORTING AND SUSTAINING CHANGES IN SHIPYARDS

Critical Strategies Needed for Quality of Work Life and Other Employee Participation Changes

Peter Lazes

Introduction

In recent years there has been consistent evidence that altering the relationships between employees and management, and between employees and work tasks, is significant in improving productivity in U.S. shipyards (National Academy of Sciences 1983:63). Studies in 1978 and 1980 in American shipyards have indicated that to a large extent their lack of productivity is attributed to inferior organizational systems and ineffective use of the work force (Appledore 1980) (Marine Equipment Leasing 1979). As in foreign yards, United States shipyards have been affected by changes in worker attitudes and skills (Cooper et al 1979), increased foreign competition, and needed technological changes (e.g., from functional to zone construction) (Shinto 1980).

The American shipbuilding industry is not alone in becoming outpaced by foreign technologies and innovative methods of creating more productive/ relevant workplaces. Most observers of the U.S. economy note that attention is needed for creating 1) flexible work settings and 2) use of creativity and commitment of employees in order to remain competitive in international trade (Williams 1982).

Examples of Employee Participation in the United States

The attempt to engage managers and non-managers in workplace changes is uniquely American. Prior to World War I over two thousand labor/management councils were established to review methods for improving productivity during the war years (Mitchell in press). Recent attempts to structure increased employee participation have resulted in varied activities such as quality control circles, problem solving teams, profit sharing, and semi-autonomous work groups. Consistent with these activities has been the attempt to delegate decision making to all levels of the organization, providing greater opportunity for employee decision making and creating a flexible work environment (for example, where job responsibilities can be changed).

Approaches such as formal quality control circles or joint labor/ management steering committees have created what some call parallel structures to the existing hierarchy of an organization. By comparison, strategies of work redesign and socio-technical system changes lead to needed modifications in the formal tasks, management, and reward systems. These

changes necessitate careful development and support for sustaining them over time.

This paper reviews how to strengthen selected employee participation efforts in order to sustain key organizational and system changes in shipyards.

Recent Shifts in Employee Participation Activities in the United States

Much has been learned about forms of employee participation strategies over the last 12 to 14 years. This involves more than being aware of needed training and structural changes (Goodman 1979). Present economic problems have shifted participation activities from a modest wait and see process, without total company commitment, to a more aggressive what can it do for business strategy. In such companies as Xerox and Ford Motor Company, employee involvement activities have been designed to tackle such issues as employment security and improvement in the reliability and quality of specific products. In other situations, employee participation activities have provided a systematic way for solving daily time consuming problems so that upper management and non-management leaders can have more time for strategic planning (Bell Labs 1983). Though employee participation activities are varied in focus, commitment and structure, some important general shifts have taken place in the U.S. and are relevant to the shipbuilding industry. Figure 8 (following page) summarizes recent shifts in worker participation activities.

Common Pitfalls of Employee Participation Activities and Suggested Alternatives to Help Support Needed Changes

Fear of the Unknown - Fess of Failing

Employee participation activities create new situations in work settings. Having the authority to solve problems at work, change job tasks or workflow creates new experiences for employees. Often employee participation activities in plants are established with limited initial preparation for the complications and uncertainties of these change activities. Both man-

CURRENT SHIFTS IN EMPLOYEE PARTICIPATION ACTIVITIES

PAST EFFORTS		FUTURE FOCUS
Priorities and activities established by management	→	Labor and management jointly establish needed activities
Activities developed and established on a department by department (piecemeal) basis	→	Creating a total organization approach
QWL/EI as an isolated activity	→	QWL/EI integrated into mainstream of daily work activities
Minor assessment of readiness	→	Upfront analysis of needs and readiness
Problem solving activities	→	Work Re-Design
Limited organizational changes in structure and policies	→	Significant changes in organization structure and policies
Little or no change in responsibilities and roles of both labor and management	→	Shifts in roles of both labor and management
Job satisfaction and job gratification	→	Employment security
Voluntary process	→	A way of life for all employees
Limited, "one shot" training for "teams"	→	Continuous comprehensive training for work groups
Little or no coaching and training in management leadership for labor	→	Extensive joint and separate training for both labor and management groups
Consultants do consulting, monitoring, training, assessing needs and readiness	→	Consultants, in-house facilitator/trainers and various labor/management committees jointly involved in monitoring, training, assessment activities

FIGURE 8
Current Shifts in Employee Participation Activities

agement and labor are affected. Although just how employee participation activities will expand is difficult to anticipate, here are suggestions that should help make the effort more successful.

1. Involve both union and management in establishing initial goals and objectives.
2. Communicate goals and objectives to all employees.
3. Establish employee participation activities gradually, in a step-wise manner, so that all employees have sufficient time to adjust to new situations
4. Avoid surprises.

Lack of a Total System Approach

Employee participation programs usually start in one department or unit of a plant or shipyard. When only one group of employees are experiencing change through increased involvement, a high probability of conflict results between employees who are involved and those who are not participating. A recent classic example of this was of a quality of work life project at the Rushton Mine in Pennsylvania. In this situation substantial improvements were made in one area of a coal mine. The lack of a total process limited these improvements to one area only. Other miners therefore could not obtain the benefits of improved work methods. This conflict between groups finally caused the union to withdraw from this joint activity. Soon after, the entire project folded (Goodman 1979). Remedies include

1. Establish ways to create employee participation activi-

ties so that everyone in an organization will eventually be included.

2. Insure that all employees keep up-to-date with progress of activities, especially during the initial stages.
3. Keep all non-participants informed of when they will be included in the process and how planned changes will be advantageous to them as well as to the employees affected by the new processes of work responsibilities.

Lack of Coaching and Nurturing of Labor and Management

Whether an organization is engaged in quality control circles or other employee participation changes, both the roles and responsibilities of labor and management will be affected since many of these are new. Coaching is needed on how to act and what to do. Quality control circles create a format for workers to participate in decision making about their work. More advanced work groups get involved in planning, scheduling and coordinating work. In fact, at Sun Shipbuilding and Drydock Company, these changes resulted in self-managing work groups in the fabrication and outfitting areas of the yard. Here specific teams of workers actually coordinated and scheduled their own activities with different crafts and staff groups. The employees engaged in these activities needed coaching on initiating these changes.

Where companies and labor view creating modifications in work tasks as important, interaction between different divisions and services is needed. Both management and labor need preparation and coaching in their changing roles. As supervisors become coordinators and resource persons for other employees, they too need additional nurturing. With an increased role in decision making, workers assume more activities which were solely in the domain of the supervisor. Without adequate preparation and coaching to shape new roles, employee involvement activities will eventually revert back to the old boss and worker mode. Remedies include:

1. Adequate training is needed for both labor and management in employee participation activities as they move from problem-solving activities to more complete work design and work tasks.
2. In a unionized yard, all of these activities need to be done with the active involvement and consent of union officials.
3. Labor and management need adequate time to learn and shape their new roles.
4. Lastly, both labor and management need tangible reinforcement for new styles of work. To insure adherence to changes, economic compensation is needed. Bonus, promotion, gain sharing and profit sharing systems are needed to reinforce cooperation. Reinforcements should reward everyone — not just the company and management.

Lack of a Joint Labor/Management Process

Many companies embark on establishing employee participation strategies without involving labor unions. The sense of urgency to initiate a project has left significant people out. At other times, creating an environment wherein all employees can feel an ownership of the process is lacking. Regardless of the reason, a management-dominated process will place limits on the degree to which employees will be committed to changes. A recent project illustrates this point.

The staff group of a communications firm in the Northeast were not very responsive towards initial attempts to get involved in creating a quality of work life process. Once a joint

labor/ management committee was formed and an extensive series of interviews were conducted with employees, there was little problem in recruiting employees for proposed intergroup problem solving teams. Initially, management did not recognize the need for such joint activities.

On the other hand, recent unilateral management activities have polarized several unions to state publicly that they will have nothing to do with quality control circles. Yet privately they acknowledge that if there was a genuine offer to participate as a co-partner in the process they would indeed cooperate. Remedies include

1. Establish a joint labor/management planning and policy committee from the beginning (this group would be responsible for overseeing the development of employee participation activities).
2. Establish joint labor/management committees in each department to help support and encourage employee participation activities
3. Keep labor (even in the non-union shop) informed of changes going on that would affect or be affected by employee participation activities.
4. Create a joint labor/management committee to monitor and assess the process of activities and to assist groups, when needed, to implement solutions.

Limited Development of Basic Monitoring and Assessment Activities

Monitoring and assessment activities are usually left to last in the process of establishing employee participation activities. Generally, the prime focus of activities is on the development of problem-solving teams, self-managing work groups and so forth, but not on how to keep track of what they do. Many organizations are not skilled in how to establish systematic and reliable monitoring activities that collect data about the process and outcomes of the total process. Without adequate monitoring and assessment activities key areas for corrective actions are ignored or receive delayed attention. An example of this recently occurred with an office equipment manufacturing firm. After two years of extensive problem solving activities in four manufacturing plants, the union/ management policy committee was informed that high attrition among team members was causing problems. Careful analysis revealed that over the last two years there were prolonged delays in getting specific solutions implemented in the plants and work settings. In a number of cases, solutions were identified but not carried out. Although joint labor/ management committees were in place in each of these locations, little attention was paid to systematically monitoring the actual problem solving activities. An outgrowth of not getting solutions implemented was a growing discontent among employees about the value of problem solving activities. Recruitment for new teams became difficult until monitoring and other activities were developed to remove bottlenecks in getting solutions implemented. Remedies include:

1. Monitoring and assessment strategies need to be established from the beginning and should be fully integrated into the roles and responsibilities of labor and management groups.
2. Process and outcome measures should be developed to keep track of planned problem solving and other employee participation activities.
3. Monitoring and assessment criteria for looking at process and outcome questions should be developed

jointly by labor and management at all levels of the organization.

Links Between Employee Participation Strategies and Employment security

Despite efforts to involve employees in decisions to improve operations, there is an absence of coordinating such efforts with strategies to ensure job security. The threat of lay-offs reduces employees' willingness to engage in employee participation activities: 'Why should I put myself out of a job sooner than need be?'

Many firms are convinced that employees can understand that employee participation activities have nothing to do with lay-offs — there should be no connection. Most employees don't see it that way. Remedies include

1. Establish labor/ management teams that will investigate new work (other than shipbuilding and repair work) that can be undertaken with present facilities.
2. Establish labor/ management teams to analyze additional manufacturing needs of present users.

Conclusion

Although attempts are being made to optimize the use of new technologies and equipment in shipyards, these changes are not enough (Elden 1983). The Japanese have realized that in order to remain competitive in shipbuilding aggressive steps are needed to retrain workers and reorganize work (Shinto 1980). In other industries the Norwegians too see employee participation as a critical strategy.

Changes in the philosophy of management and union practices and in scope of job responsibilities usually means changing the culture of an industry or organization. Incremental steps — taken jointly by labor and management — are needed. A foundation of participation should be in place as a group moves from one stage of employee participation, as in problem-solving activities, to more complicated stages, including self-managing work groups. The process is not an easy one.

It is hoped that you have gained some insights into problems that have limited the impact of employee participation activities, as well as reviewed specific suggestions to help avoid such problems in the future. There is obviously no quick fix.

Discussion

Ande Abbott How much time during an 8-hour day would a first line supervisor spend to do this properly?

Peter Lazes I estimate it was about quarter-time responsibility. He needed time to coordinate and assist teams rather than provide direct supervision. In the long-haul, he will have to spend less time as a supervisor and increasing time coordinating and providing resources to teams. These changes will help free up the supervisor to do other tasks.

John Roper Do you know of any cases in which the presence of this parallel structure within the company gave rise to a power structure that eventually brought the program down?

Peter Lazes No I don't, but I'm sure it could happen. The trick is to have all the principals on the management and unions sides agree to jointly work on such a process. It is usually a mistake to establish employee involvement activities without top level labor and management commitment to work jointly on such activities.

CHOOSING A STRATEGY

- STARTING UP

Open Workshop #1

Panel Frank Long, Joe Flynn, Bill Batt, Gene Chambliss, Don Kane, Ande Abbott, Bob Schaffran, Peter Lazes, Les Calder

Frank Long We spent our time discussing how to put some theory into practice for the benefit of those yards which are planning to get started with worker participation programs in the near future. I am personally involved with the start-up of a program at Bethlehem's Beaumont yard which has a contractual responsibility to begin an experimental quality of work life project within the life of the present agreement. The language of that agreement is patterned closely on the language of that portion of the Bethlehem steel agreement that deals with labor-management cooperation.

One of the difficulties at Beaumont, in contrast to Sparrows Point, is that nine separate unions represent the employees. Seven negotiate together as the Metal Trades Council, while the Pipefitters and the Machinists both negotiate independently. So management bargains with three separate entities. With regard to the quality of work life project, this means that each union will have to be represented on the various levels of steering committees.

One of the first steps to be taken in initiating a project is to bring in a consultant to act as a technical adviser both to management and to labor, and to act as an intermediary between these parties. There is also the matter of use of in-house consultants, but our group did not have enough time to discuss this very thoroughly.

The next step is for all parties to be given the opportunity to pass judgement on the consultant — since he will be consultant to the unions as well as to management.

Then the policy and planning committee is formed. In the case of the Bethlehem yards, the agreement calls for a jointly constituted (labor and management) planning committee. It is this structure that will provide oversight to the overall project. At Sparrows Point, one of the first responsibilities of the steering committee was to assign the coordinators, those individuals which serve as the direct link between the steering committee and the many employee involvement teams. At Sparrows Point we have two such coordinators, one from management and one from labor.

The next step frequently consists of the external consultant, with some internal assistance, conducting interviews throughout the yard to determine the degree of readiness for change in this direction. The objective of this stage, at Sparrows Point, was to determine not only which elements of the yard were predisposed to worker participation, but also to identify those topics that were good candidates for initial treatment, poor candidates, or questionable, requiring further consideration and discussion.

As the process begins to pick up momentum, it is important to have a means of communicating throughout the yard what it is that is happening. At Sparrows Point, we initiated a newsletter for this purpose which was written by one member each from the management and labor sides of the steering committee.

An off-site workshop is the next step, a residential conference located somewhere other than the yard at which time

management and labor jointly plan their strategy and objectives. In the case of Sparrows Point, it was at the initial off-site that the decision was made to form the first three employee involvement teams by combining the many crafts throughout the yard. That came as a surprise to me and to many others, but it was the decision of the steering committee to go this route by combining the crafts. Within three geographic areas of the yard (e.g., building basin, assembly area, and the piers).

Unfortunately, once the teams were established at Sparrows Point, the yard experienced a very severe reduction in workload. On the advice of our consultant we attempted to keep the teams going, but they just could not function under the conditions, and we subsequently learned that the decision to push on in spite of the minimal workload was an error.

When work picked up again, we tried to revive the teams, but that didn't work and what was required was an actual rebirth of the teams under a different structure. It became painfully obvious that the multiple craft structure wouldn't work and we shifted to teams composed of individuals working together on a regular basis.

This latter structure is what we have in mind for the Beaumont Yard, although it will be the joint steering committee that has the final say as to the approach to be taken.

One of the problems that we didn't address in our group, and one that has not been addressed at Sparrows Point, has to do with the approval process for employee involvement team suggestions. Exactly how are suggestions made by the teams to be processed leading to a rejection or acceptance by management? And how are the teams to be rewarded for successful innovations?

Peter Lazes When the downturn occurred at Sun Ship, we were concerned about maintaining the process. A number of precautions were taken. One was to attempt to recruit into the teams the more senior employees within the yard, those not likely to be laid-off. It was interesting to note that the enthusiasm for the project grew stronger as the economic climate for the yard grew more grim. We had more people volunteering for membership on the teams in the darkest days than at the beginning of the program. I think it had a lot to do with the increased sense of need to do something to save the yard. Another thing we did at the time of the downturn, was to shift from problem-solving efforts into autonomous work groups. The lesson to be learned from this is that when faced with changing environmental conditions (such as a downturn) it is important to be able to shift gears within the program.

Frank Long The downturn at Sparrows Point coincided with the peak of enthusiasm resulting from the newness of the effort. So it would have been very difficult to make the decision to stop it then. In fact, we had a number of employees continue their participation in the teams even after they were laid off. But eventually, and understandably, the topic of discussion at the meetings shifted away from the problems of the yard, and focused on their personal problems (when am I going to be laid off ;when am I going to be called back).

Steve Sullivan At Sparrows Point we also tried to get more senior employees involved in the teams, as a hedge against the downturn. But we erred in predicting the level of seniority required. The downturn was worse than we thought, and many fellows with substantial seniority were laid off. I think the difference between the Sparrows Point and Sun Ship experiences has to do with the maturity of the project. Sun Ship was well into its second year of worker participation when they experienced their downturn. At Sparrows Point we were only starting and there was not enough history to sustain the process.

Peter Lazes Downturn or not, for any project to succeed you have to constantly monitor and make adjustments. That is because the environment is never static. It changes all the time. You can't institute these programs and then just walk away from them on the assumption that they will remain the same.

Howard Bunch Could it be that these programs change because of the changing influence of management? Could it be that management has a more significant influence initially, and that because of their uneasiness with surrendering traditional prerogatives the teams generally start out as problem-solving groups only (which are relatively safe and sanitized). Then, as management becomes more comfortable with worker participation, they loosen up and the teams are able to shift into the more heady stuff of autonomous work groups? Could this evolution be as important as the stimulus to change through such external factors as economic necessity?

Gerry Swanson The evolution of these projects is something that has to be planned for, whether it occurs as the result of a loosening up on the part of management, or because of something new on the scene that could not have been anticipated. It is important to have a degree of flexibility built into the program. The Lockheed program was started in a fashion quite different from traditional approaches. Our first circle had as many as four levels of management involvement. One of the four initial circles had as a member the director of new construction.

Howard Bunch Wouldn't that level of manager tend to dominate the discussion? How could a production worker participate in a circle on an even footing with the director of new construction?

Gerry Swanson No, because we had a commitment from that individual, as with all the other managers, not to exercise the power of his rank within the circle meetings. It also helped that the coordinator for the circle was an individual with approximately the same external rank as the director of new construction (and this too is unusual for quality circle programs), and he could give the managers feedback when they were tending to stifle discussion because of the use of their rank.

It is interesting to note that the director of new construction was cautious of the program at first, and made a point of sitting in on all the circles in his department, amounting to a four-hour-per-week commitment. He did this for about a month until he was satisfied that he knew what the program was all about and that it was not going to result in a revolutionary overthrow of the management structure. He then left monitoring responsibility to the next level of management which was the production manager. This individual was a very busy man too and couldn't spend that much time per week in quality circle meetings (and by this time the program was growing and there were more than the original

four circles in the department). So he eventually passed his monitoring responsibility to the next level of management, and by the end of the first year, the circles were operating without high level management participation, as they are generally expected to operate according to usual quality circle practice.

So we arrived at the same point as most quality circle programs, but through a different route, one of close observation by high level management. In this fashion we obtained the sanctioning of upper and middle level management through active involvement with the circles. A trust was built with these managers that might not have otherwise been achieved.

Frank Long What sort of topics were addressed by the circles? Was there this evolution from safe to risky projects?

Gerry Swanson Yes, I would say that we experienced that shift. But I would add that our initial four circles were formed at a time when the yard was gearing up for a major new construction effort, a building program that gave a theme to the circles from the start — how best to prepare for this new work? So it wasn't really a case of the earliest topics dealing with ways of improving on old practices. From the beginning these circles had the objective of accomplishing major changes.

George Roper We found the same thing at Norfolk Shipyard. We started as a project directed toward turning around the performance of one of our plants that was in trouble and had been put on notice by the Navy. It had to shape up or there would be no more Navy work coming its way. In a sense, we treated this plant as an autonomous work group and set up quality circles. The program had to be initiated in a hurry so there was no time for involvement of upper levels of management. But in spite of the fact that the pressures in this instance did not allow the luxury of a gradual evolution of objectives, these circles have changed their emphases, and I expect they will continue to do so.

Ben Scribner At Bethlehem there is a firm commitment to making worker participation a totally joint effort on the part of labor and management, so it is not management-dominated at any point in the process. At the off-site kick-off workshop for these projects there is an absolute turning-over of responsibility from corporate and international union management to the plant and local union joint steering committee. The steering committee comes into being at that point, and from then on they have the ball. Therefore, Howard's premise that management dominates in the early stages of a project is not accurate — at least not at Bethlehem.

Bill Batt I think this is the difference between a quality of work life project and a basic quality circle project. The former entails the presence and direction of a joint labor-management committee.

John Roper Perhaps just as important as getting labor involved from the very beginning, is getting all levels of management involved from the very beginning, which Lockheed appears to have accomplished very nicely.

Gerry Swanson It is important to recognize that these programs must be customized to fit the individual organizations for which they are designed. The answers for Lockheed are not necessarily the answers for Bethlehem, or for any other yard. At Lockheed, the history was one of power being held very closely at the top levels of management, even with our current president who has recognized the value of moving strongly in the direction of worker participation. With this history behind us, should we have gone to the union and said,

"Look, we want to get you involved in this" their reaction would have been one of tremendous distrust. How else could they react given the lopsided power relationship that had existed between labor and management in the past. So what Lockheed did was to unilaterally move in this direction to demonstrate that the company was indeed sincere in working differently in the future. Actions speak louder than words. Trust is based on past performance, and the unions would have been correct to distrust Lockheed in this new proposal. It was necessary for them to see visible changes in management attitude.

Frank Long It is not just a matter of customizing projects to fit the management styles of the yards, it is also a case of customizing projects to respond to the history of labor-management relations in the individual yards.

Gerry Swanson That's right, and in the case of Lockheed that relationship had been extremely adversarial.

Peter Lazes At the same time, the Steelworkers and Bethlehem have not always had a harmonious relationship. It is really a strategic decision as to whether projects such as this should be started up unilaterally or in conjunction with the unions.

Frank Long You are correct, and the process of introducing worker participation in Bethlehem has proceeded in different ways and at different rates because of variations in the quality of labor-management relations at different plants.

Ben Scribner Bethlehem did extensive interviewing in 19 different plants prior to commencing its worker participation programs in steel. The objective was to determine where they should start first. The most difficult environments were not tackled first, so that initial successes in the less difficult plants could serve as evidence of the value of such programs. The overall corporate effort is now at the point where some movement is occurring in all locations.

Max Elden There are two factors that are decisive in this matter of starting-up. It is, of course, important to have start-up success to get some momentum building. But we have started in Norway in some instances in environments which have been judged hopeless by most casual observers, but where our analytical tools have told us there was a chance to really make a difference. Success in that sort of intervention (in a difficult environment) can be a very powerful demonstration of the utility of worker participation. People will sit up and pay attention when it is made to work in hopeless situations. On the other hand, if you choose an environment that is too "easy", critics can sit back and say that it was too easy, that it doesn't work in the real world, etc.

Ben Scribner I understand, but let me tell you of the risks in that latter approach. In 1980, the Vice President for Operations of Bethlehem Steel wanted us to start teams in the Lackawanna Plant, and everybody knows the status of Lackawanna — steelmaking mostly shut-down, operations limited to some finishing mills. There is no question that association with Lackawanna would have spelled disaster for the overall worker participation effort in Bethlehem, and might even have killed it entirely. It is a good thing that we did not try it there.

Peter Lazes To return to Howard's question, I think that it may be true that management's influence is stronger (even if only subtly) in the beginning of these programs, and that this is reflected in the priority of activities. But I also think it is true

that these priorities shift during the life of the program, not only because of a balancing of labor and management influence, but simply because of the maturing of all the participants and the structure. The participants become comfortable with the process and get more adventurous.

I want to add that a consultant can impair the evolution of these projects when his function is not so much to assist in the process, but is to deliver a specific packaged product. This risk is greatest when the consultant is selling pre-packaged quality circle programs.

Jim Acton The choice of a consultant is critical in this activity, as it is in other types of programs. It is important to steer clear of charlatan practitioners who have an off-the-shelf product to sell. Better to retain a true consultant who will help the participants think through what variation of the available techniques are best for them.

Howard Bunch Unfortunately, these charlatan consultants don't walk around with signs to this effect affixed to their backs.

Ande Abbott It is also important that a yard not hire a consultant who has a reputation as a union buster (and there are a number of worker participation consultants out there who are really selling that service to some managements. The unions maintain lists of these individuals and firms, so it would be a good idea to be sure the consultant hired is not on this list. If he is, this will severely prejudice cooperation on the part of the unions.

Howard Bunch That seems to be one way to weed out the candidate consultants; check them out with the unions before hiring.

Jim Acton More than that, I think that this sort of activity requires that management and labor jointly evaluate candidate consultants and make the decision together as to which one they wish to work with.

PLANNING FOR THE SHIPYARD OF THE FUTURE Open Workshop #2

Panel Jack Garvey, Henry Jones, Dan- Romanchuk, Jim Acton, George Roper, Howard Bunch, Bruce Bradley, Mike Gaffney, Max Elden

Jack Garvey Our workshop was a brainstorming exercise to forecast what the shipyard of the not-to-distant future (1990s) might look like. In this prediction we were guided by trends in evidence today, which we believe will be continued and accelerated in the next ten to twenty years.

The trends we noted were both of a technical, social, and commercial nature. The latter trend, that of very stiff competition in the world shipbuilding market, we feel to be primary in terms of stimulating change. In that regard, it appears that the U.S. commercial shipbuilding industry has only about a 50/50 chance of even making it to the 1990s. But, being optimists, we viewed the glass as half-full rather than half-empty and

proceeded on the assumption that the industry would survive.

For the most part, our shipyard of the future profile highlights changes of a social/ organizational rather than technological nature. And that's not because this is a human resource conference, it's because we don't see any major hardware technological innovations in this time-frame. To an outside observer, the shipyards of the 1990s will look very much like the yards of today. They will not be the shipbuilding equivalents of the factory of the future. Nor will the products of these yards be much changed. Ships will still be made of steel, they will still require engines to push them around, and the cargoes will still be coal, oil, grain, etc.

We predict that most changes will center around the adoption of the zone-by-stage construction method, a variation of the concept of group technology. Engineers tend to think of this as a technology. But it really isn't, not in the sense of hardware technology. It is a new organization of work, a new management technique. The outside observer comparing shipyard organizational charts from 1980 and 1990 would note quite a difference.

Other areas of change will likely include a substantial movement in the direction of accuracy control, or statistical process control. This innovation entails people inspecting their own work, a change from the more familiar practice of using specialists for this purpose. Accuracy control is associated with zone construction.

One exception to our prediction of few hardware technology changes is that of the computer. We predict that computers (especially microcomputers) will play a very important role in management information systems. They will be widespread throughout the yard and will be used not only by full-time managers, but also by fret-line supervisors and even by skilled tradesmen. Gone will be the days of extensive printouts generated by the central data processing department for the exclusive use of only a few managers. Employees at all levels throughout the yard will have nearly real-time access to all sources of information relevant to the production process. The process of extending management tasks to lower levels of the organization will be greatly facilitated by this use of the computer.

We also see a shortage of skilled workers in the 1990s. Many of the skills required will not be readily available. Therefore there will be a renewed emphasis on training. This will be complemented by efforts to attract and retain qualified employees. And to accomplish this retention, shipbuilders will be making extensive efforts to improve the working environment within the yards. That outside observer, comparing aerial photographs taken in 1980 and 1990, will see much more of the yards under cover. A closer view would show a general emphasis on making the workplace less hostile and less uncomfortable. In the same vein, safety will receive considerable attention in the 1990s.

The shipyard of the 1990s will probably be substantially smaller than most U.S. yards today. Studies have shown us that most of the productive yards overseas have a workforce in the range of 3500 to 5000 employees. That number, by current U.S. standards, would be a rather small yard. It is not at all unusual to see U.S. yards with 8000 to 9000 workers, and there are several that are over 20,000. These large yards become almost impossible to manage effectively.

Discussion

Gene Chambliss Do you see less people in the yard as a result of the consolidation of craft lines?

Jack Garvey No. I see a smaller workforce as the result of a conscious attempt to improve the efficiency of management. A yard of 3500 in 1990 will be putting out as much work (6-8 commercial ships a year) as a yard today with 6000 to 7000 employees. A merging of crafts may be the result of the shortage of skilled trades, however.

Gene Chambliss Did you address the issue of cross-crafting at all?

Jim Acton No, except in the context of a shortage of skilled workers. Many of us are now seeing 15-25 year shipyard workers retiring without any intermediate level advancement into these vacated billets. Shipbuilding demography now shows two rather distinct groups in the yards. There is the 15-25 year experience group, and the 5 year experience group. So it is not a question of the erosion of our skilled worker base, it is a matter of falling off the cliff.

Jack Garvey I also think we will experience a greater dependence on subcontractors in the future. This would serve to smooth out the peaks and valleys in shipbuilding employment cycles.

Howard Bunch We also predicted that more design work will be done at the yard rather than at external design agencies. This will be facilitated by the use of computers. Additionally, we predict an integration of the now distinct functions of the design and production departments.

Jim Acton In connection with this trend toward smaller, more manageable shipyards, I would like to see someone at least attempt an optimization analysis concluding in the most manageable size of an organization.

Howard Bunch There has been work on that, not in shipbuilding but in manufacturing environments. The magic number seems to be in the range from 800 to 1200. Interestingly, the automotive industry found in their observations of their Japanese counterparts, that the Japanese car makers have substantially smaller plant organizations in terms of manpower and smaller plants in terms of square footage.

And there is a relationship between this phenomenon and the SPC panel that Jim Acton heads up, Flexible Manufacturing. As you move into flexible manufacturing systems, the economics of scale become less important, and economies of communication dominate. The result is a much smaller plant size.

Jack Garvey We also see an expansion into other products and markets in order to maintain a stable and consistent workload. Shipbuilding is a very volatile market and there needs to be some products added to the yards that would serve to dampen this oscillation.

The external environment of shipbuilding will also likely be quite different. The relationship of the yards to such external organizations as design agencies, regulatory agencies, customers, and government will likely be significantly different — and it is this change that may be most difficult to deal with since there is no central administration guiding the relationship between these parties. Such change will be the result of both internal and external forces.

EVIDENCE, EVALUATION, ASSESSMENT

Open Workshop #3

Panel Gerry Swanson, Ben Scribner, George Roper, Dan Denison, Aubrey Daniels

Gerry Swanson The subject of our workshop was the establishment of criteria measuring success of social technology programs. The most important step in this process is the identification of the purpose of the program. What is the program intended to remedy? Is there a specific goal or strategy underlying the program. or is the activity seen as a potential cure for the general ills of the shipyard.

If specific objectives have been identified for the program (e.g., reduction in turnover, increase productivity, decrease accident and illness rate, cut number of grievances), evaluation is a matter of measuring the relevant behaviors related to those specific outcomes (e.g., turnover, productivity, accident rate, number of grievances). This is frequently the approach with evaluation of quality circles. What is measured are the behavioral results of specific projects undertaken by the circles.

A Program as a whole can also be measured quantitatively on the basis of behavioral outcomes. The return-on-investment can be calculated by totalling the program costs (both direct and indirect) and the program returns (converted into dollars).

It is important for social technology programs not to lose sight of the goals of the company. If it is just monetary productivity results that are sought, then that is what should be measured. If the objective includes attitudinal changes, there are behavioral science methods to fairly accurately measure attitudes.

Then there is the matter of measuring from the top-down or from the bottom-up. Typically, a new program will be evaluated by management who made the decision to undertake the effort. This is a top-down approach. Programs that have established credibility may incorporate elements of bottom-up evaluation by the members of the teams themselves. Regardless of what combination of top-down or bottom-up measurement is employed, the parties who will be doing the evaluation should be involved in the initial determination of measurement criteria.

Worker participation programs do not show immediate results. It is a learning curve process entailing slow growth, and evidence of change takes some time to appear. If measurement is taken too early, a program that might have been headed for success runs the risk of being killed. At Lockheed we didn't take any measures until after 18 months — not because we were clever, but due to other reasons. At that time we were able to distinguish enough successes to warrant continuation of the program. If we had measured at six months it could have been quite a different story.

Evaluation is also useful for fine-tuning a program (rather than just deciding whether to continue or not). Norfolk Naval Shipyard revealed how they identify weak quality circles. They count the number of presentation made, the number of meetings held each month, whether or not the topics have a productivity focus (there was one circle that had as a project the monitoring of the temperature in the drinking water cooler).

It is also important that teams be in tune with where management is going with the yard. There had to be some correspondence between circle activities and management goals. If teams are off in one direction, and management is going in another, then this has to be corrected or the entire effort will fail.

George Roper Is the steering committee responsible for keeping the circles on track?

Gerry Swanson It could be the steering committee, or management's representative in the quality circle, the facilitator, or the program manager it depends on how the program is structured and reporting procedures.

Related to this topic, our workshop considered whether supervisors should be part of the circles. I believe it was the consensus that they should be. You need to have somebody on the team who really knows the business — as opposed to some whiz at group processes, but doesn't have a clue as to the appropriateness of topics being tackled.

John Roper We were very fortunate to have in this workshop two yards that have had extensive experience with quality of work life and quality circle programs. They were able to answer a number of questions that I had concerning program evaluation. It was very helpful.

Dan Denison Arriving at evaluation criteria should be a process that includes both bottom-up and top-down efforts. If the criteria established do not have wide-spread support at all levels, then this reduces the chances of success for that program considerably. It is also important to arrive at criteria that are fairly long-term. These programs should be set up to run primarily on faith for the first 18 months.

LIMITED STRUCTURAL CHANGE

Open Workshop #4

Panel Ande Abbott, Henry Jones, Gene Chambliss, George Roper, Bob Schaffran, Howard Bunch, Dan Romanchuk, Mike Gaffney, Aubrey Daniels

Ande Abbott Limited structural change refers to those social technology programs that entail least threat to traditional management style and organization of work. It was chosen as an open workshop theme because there are likely many managements and union leaders who wish to move tentatively in this direction, but are not ready to commit to a more comprehensive or wholesale revision of past practice.

Performance management qualities as limited structural change in that it is directed toward improving existing working practices. And in its initial application, the technique makes

se of traditional hierarchical relationships within organizations. Phase I of a performance management program consists of educating the supervisors in the value of positive reinforcement. Nothing too threatening here. Phase 2 of performance management entails a variation on the quality circle theme in which the reinforcers are not limited to supervisors, but are found within the peer group as well. And if a yard chose not to form these performance teams, the program would still have been useful at the Phase 1 level, focusing on management training only. It appears, that these performance teams maybe a cross-fertilization of the individual-focused and group-focused programs discussed in this Workshop.

Even the most restricted variants of quality circles do entail a degree of decision-making sharing between management and labor, but these too would qualify as limited structural change in that they need not always be instituted as a separate and parallel structure to that of the traditional chain-of-command. Although it is a misconception to view any worker participation program as a surrender of management control, quality circle programs reserved solely for the purposes of problem-solving are less threatening than quality of work life or socio-technical design programs. Quality circles may be employed in specific work sites, or in multi-craft settings, thereby offering a degree of flexibility. They can also be put to specific tasks or directions established by management.

While such quality circle programs lead to slow change and offer the advantage of gradual reduction of suspicions and resistance, they may also produce less significant results than other forms of worker participation. Depending upon the overall structure in which they are initially formed, they maybe more or less difficult to evolve into more comprehensive programs.

Regardless of which limited structural change technique (or combination of techniques) is chosen, it is imperative that bottom-line performance results be achieved as rapidly as possible.

Mike Gaffney I want to point out that Aubrey Daniels' approach to industrial behavior modification is rather unique in that his individual-focused technique is combined and phased in with a group-focused orientation. Most behavior modification practitioners would go no further than Phase I of performance management. In Phase 2, Daniels recommends the formation of performance teams which operate much as quality circles. Unfortunately, there was not enough time for Aubrey to explain to us how Phase 1 efforts to establish performance standards and closely monitor performance of specific individual tasks, is translated into performance teams. We described this problem using a sports analogy in which the performance of a team is improved through behavior modification (charting the number of tackles made by individual defensive players, and the number of blocks thrown, and yards gained by offensive players). How this technique might improve individual player performance is rather straightforward. The question is posed, however, how this technique would ever lead to a new use of the fullback, or the creation of a new play (working smarter rather than working harder). Aubrey maintained that there are ways to standardize and positively reinforce creative behavior, but we didn't have the time to draw him out on this.

Ande Abbott Although there is clearly a difference of view with regard to the efficacy of behavior modification vs. worker participation, we were all in agreement as to the advantages of

incorporating positive reinforcement into worker participation programs. I personally have some doubts about the operation of individual performance evaluation systems because I have seen so many work so poorly in the past. I certainly have no quarrel with the use of positive reinforcement.

Dan Denison I think our group made an important observation when we agreed that the source of positive reinforcement need not be a supervisor as is generally the case in behavior modification programs. Positive reinforcement may come just as effectively (perhaps even more effectively) from one's peers in a small work group. This, I think, is the link between the individual and group-focused approaches we have been discussing. Each member of a work group is potentially a source of positive reinforcement. Aubrey said that an organization of 5000 people has potentially 5000 sources of positive reinforcement. It is not solely a management task.

SOCIO-TECHNICAL SYSTEMS Open Workshop #5

Panel Ben Scribner, Joe Flynn, Don Kane, Gerry Swanson, Jack Garvey, Jim Acton, Max Elden, Dan Denison,

Ben Scribner The topic for this workshop was socio-technical systems, counterpoint, if you will, to the workshop on limited structural change. Socio-technical systems refers to rather dramatically restructured work environments designed to maximize the utility of available human (socio) and technical resources. Such designs often take the form of variations on the theme of autonomous or semi-autonomous work groups and we began our workshop by viewing two films depicting such systems in operation, one in banking and the other in manufacturing.

What is involved is the formation of fairly autonomous (self-managed) teams of workers who largely plan, undertake, and evaluate their own work, including in many instances, staff functions that are traditionally covered by specialist (e.g., personnel, industrial engineering, etc.)

What is novel about socio-technical systems is not only the content of the changes (such as autonomous work groups), but also the process by which these changes are arrived at.

One approach entails reliance upon an expert in socio-technical systems that scans the technical operation as well as the characteristics of the workforce and the organization, and comes up with a best-fit of the requirements of the two.

Another approach is to rely heavily upon the skills and insights of the workforce itself to redesign its own socio-technical system. This form of analysis may be as rigorous as that provided by the external expert, or it may be more intuitive. At Bethlehem, we are clearly making use of this latter approach.

With regard to the issue of control, there is no question but that the implementation of a socio-technical system design within an organization entails a reshuffling of power or control within that organization. If a yard is not prepared to do this, then a socio-technical systems design may not be appropriate for them. Frequently, such innovations as autonomous work

groups are, not tried in an organization until it has had some experience with less challenging forms of worker participation.

Howard Bunch How can a yard know that it is ready to try something like this? How many levels of management have to have the requisite amount of trust before it will work. I would presume the CEO has to have this trust; but how far down, and how deeply felt, does this trust have to extend through the management ranks?

Ben Scribner I've never seen a better example of the operationalization of trust than at Cummings Engine in Jamestown, New York. They don't use the term socio-technical system, they refer to trust. It is the philosophy of the top levels of that company to involve production workers in all facets of the operation. Not too surprisingly they run the production show, but they also have a strong say in engineering and personnel functions as well. At Bethlehem Steel we are not so far along. For us, it is more a case of the very top executives making a decision to go this way, even though not everyone else is convinced and even though it will take many years to develop such a corporate culture as is evidenced at Cummings. But Bethlehem management has committed itself to the task, and is providing the funds and expertise to get the job done. It is part of our labor contracts now, and will eventually be internalized as a value throughout the corporation.

Max Elden In this group we talked about trust, control; but we also talked about training. As a manager, I wouldn't be too eager to trust my workers with greatly expanded responsibilities if I didn't feel they were trained to handle the task. I also want to add that in Norway, where this socio-technical approach was first developed, it was developed by industrial engineers, and there are still a number of such consultants who are assisting companies in reorganization along these lines. As Ben pointed out, the more recent alternative is to let the employees do their own socio-technical system design. But that doesn't mean you just throw them into a conference room with instructions to get on with it. They first have to be trained in how to analyze the relationship between technical and human systems. Training is important.

Jim Acton I will be the first to say that the man actually doing the job is the expert on that job. But I have to point out that this industry is undergoing some drastic technical changes in manufacturing, machines, and metals. If you rely solely on your employees, where will the exposure to the new technology come from? We need external consultants, or we will find ourselves experts in obsolete technology.

Max Elden The point I was trying to make earlier was that it is not an either/or situation. There is expertise out there, and you may very well bring a consultant in. But it is also possible to train your own people so that they may do much of it themselves. It is this combination of external expertise and local theory that makes for the best system design. Don't make the mistake of thinking of socio-technical systems design as a closed system, the workers doing it all on their own. On the other hand, this new use of the workforce is much more desirable than just bringing in an expert to lay a design on them.

REWARD SYSTEMS

Open Workshop #6

Panel John Roper, Steve Sullivan, Bill Batt, Bruce Bradley, Frank Long, Peter Lazes

John Roper We considered two types of reward systems, one intrinsic, the other extrinsic. Intrinsic rewards are those that are limited to the sense of accomplishment itself. Extrinsic rewards take the form of additional compensation, generally in the form of money.

Intrinsic reward systems, which provide the opportunity for achievement and then consequent recognition and reinforcement, are nothing new on the scene, and are integral to successful shipbuilding. Many yards have always had intrinsic reward systems operating. They had it when they were small, and they managed not to lose it as they grew larger. The characteristic environment is one in which people are allowed to get on with their jobs, are able to communicate with their managers, and have the feeling that they are an important part of the organization. This leads to a sense of commitment on the part of the employee. Occasionally, intrinsic reward systems are complemented by the practice of giving out visible, yet non-monetary, rewards — such as plaques, ball caps, etc.

Extrinsic reward systems entail various techniques of distributing the monetary gains of productivity (profit sharing, gain-sharing, Scanlon Plan, etc.). Bill Batt told of the Scanlon Plan in which a group of employees working in a defined area, through a steering committee, derive improvement in the production process, and then distribute a percentage of consequent gains by means of a separate monthly check.

Promotions are a form of extrinsic reward. Lockheed is experimenting with a system in which promotion is made by a committee rather than by a single individual. The committee, consisting of a supervisor within the department, an equivalent level supervisor from another department, and a third individual, evaluate three candidates for every promotion. Under this system, the individual promoted is rewarded not only extrinsically with the promotion, but also intrinsically in the knowledge that agreement to his elevation was broad-based within the organization.

One of the problems with extrinsic reward systems is that they are frequently so broad-based that everybody is rewarded including those not deserving of the reward.

Mike Gaffney I understand that Lockheed rewarded the entire workforce this past year by shutting down the yard for a couple extra days at Christmas, with full pay. Was this too much of a blanket reward system?

Gerry Swanson If the response of the workforce is any indication, it was an appropriate reward. It was certainly a contingent reward in that there were four objectives that had to be met throughout that year before the holidays were given. And the four objectives were sufficiently general that any and all in the yard could contribute toward their achievement. It was not meant to be realized through individual performance, but through the performance of the organization as a whole. Within the circles, there was always concern as to how the yard was standing with regard to meeting the four objectives, especially as the holidays were approached. They were quite eager to contribute toward the realization of the objectives. Of course there were some individuals who were not much

motivated by the two additional holidays, but those who were, exerted a degree of peer pressure.

Howard Bunch With Lockheed's three thousand man workforce, those two days off with pay translates into a \$600,000 cost. Did the yard realize an equal benefit from that program?

Gerry Swanson There was at least a \$2.5 million benefit. One of the four objectives was to reduce the accident rate. With the workmen's compensation system in force within shipyards, much of that cost comes directly out of pocket. Our industrial accident costs in 1981 amounted to \$5 million. The year of the program, with a larger workforce than in 1981, we reduced that to \$3.5 million.

John Roper In repair yards it is difficult to establish baselines against which to gauge performance. Every repair job is unique and unrelated to previous experience. So many factors other than individual and group effort determine the ultimate success of a repair work. Qualitative assessment used in such situations presents difficulties. Workers come to expect such awards as a normal part of their compensation package, and it is vulnerable to abuse through personal exchange of favors within the yard.

Peter Lazes There is a new book out called *In Search of Excellence*, in which the authors note that the really excellent companies share an attitude that presumes that their people are winners. This suggests that reward systems should not be set up to operate on the opposite assumption — that workers are not going to produce unless they are motivated by this extrinsic gain.

It is also a good idea to have the reward systems set up by the people it is intended to motivate, the workforce in question. Who better knows what they want? My experience has been that if you treat people with dignity and respect, they will ask for reasonable rewards, not elaborate and expensive compensation. The same applies to sharing of the hard times. The employees may prefer to share fewer jobs in a downturn by all working shorter workweeks rather than through selective layoffs.

There is a concern of inexperienced management that self-managing work groups, no longer under close supervision, will tend to slack off. The reality is just the opposite. They tend to take on more responsibilities. At Sun we had the problem of the self-managing groups getting too aggressive. They wanted to know why the steel wasn't there on time, why the design changes were delayed. At Xerox, we found the same sort of phenomenon, with the work teams pressing hard on the vendors to provide quality components on time, harder than the purchasing and accounting departments had done in the past. They wanted material and equipment that would help them realize their own performance goals.

Gerry Swanson The same thing happened at Lockheed, the most famous case being that of the painters and scalers team that conducted its own analysis of the blasting grit to find that the material was well under spec. They went directly to the supplier and not only got the quality of the grit improved thereafter, but also won a settlement on past poor quality material.

Ben Scribner Bethlehem Steel - Seattle was the recipient of some of Lockheed's work with its vendors. When the corporation made the decision to begin with labor-management participation we received quite a bit of help from that division because of their experience with Lockheed.

Jim Acton We are straying a bit from the topic of reward systems. I want to add to what Peter said about the identification of appropriate rewards. Management may not realize that what motivates them may not be what motivates a workforce that may have a value system that is quite different. I've seen workers whose main concern is to earn enough to get bread on the table, and no more. They would rather have additional time off than earn more money. Trying to improve the attendance of that group proved impossible. This notion of allowing the work group to identify its own reward preference makes a lot of sense. In many cases, management really doesn't know what the workforce wants.

Ben Scribner I was impressed by Daniels' emphasis on the need for positive reinforcement. In thinking about how I might positively reinforce, I became aware that I really don't know what the employees want. Daniels said that the best way to find out is just to ask them.

Max Elden I was impressed by that answer too, as well as by Aubrey's presentation. There are many individuals working in this field of behavior modification that operate exclusively on a top-down basis.

PRODUCTIVITY BARGAINING

Wayne Horvitz

This morning I sat in on your discussion of the balance of power between management and labor with regard to social technology programs. I'd like to examine that topic a bit closer in my remarks now because I think it has a very important bearing upon the success, or lack of success, of such innovations as quality circles, quality of work life, etc.

The change in Administration has given me some time to think and write about this subject (which I call productivity bargaining — but you can use terms such as quality of work, life, joint labor-management committees) and I want to discuss it with you now in the context of my own ten year experience at Matson Line.

Twenty-two years ago the International Longshoremen's and Warehousemen's Union and the Pacific Maritime Association signed what was viewed by many as a landmark labor agreement. Cornerstones of that agreement were the belief that technological change was necessary for the survival of the industry, that outmoded work methods and unnecessary work rules were counterproductive in the face of increased competition, and that workers had a vested interest in the content of their jobs. A corollary of those beliefs was that any changes in these conditions had to be bargained and that the bargain would reflect a compromise between the rights of both sides.

It was a fundamental change for the West Coast waterfront. The depth of its commitment to outmoded work rules was profound, and the methods of performing work had changed little since the Phoenicians. But, finally, a commitment to a new kind of bargaining and shared power produced amazing changes in productivity in the years that followed.

Not many employers or unions at that time were influenced by either the concepts or the results achieved by that agreement. There were just a few straws in the wind: some experiments in gainsharing (ala Scanlon), and an occasional agreement, such as the Armour Automation Fund, born as a result of the need for radical employment shifts in one industry. As a Scanlon disciple often said at the time and for many years after, "The Scanlon plan is more talked about than used."

But times have changed. Or have they? Certainly the local crises that brought about occasional interest here and there in gainsharing and productivity bargaining are more widespread today, and the term concession bargaining is a new catchword. But as a union leader said to me many years ago, "What management calls institutional restraint we call collective bargaining."

It is therefore my thesis that what has happened is not so much a change in structure (concession bargaining may indeed be a collective bargaining rose by another name) but a change in attitude, on the part of a relatively small segment of the management and labor community, about the nature and scope of traditional bargaining, particularly in relation to productivity. A look at past experience in the light of present day events and an examination of the experience and elements of both should be useful to those who are convinced of the need for that institution to survive and grow in a democratic society of strong unions and strong employers.

Thirty years ago, productivity bargaining focused primarily on discrete problems such as technological change and usually

involved large technological developments in particular industries. When the economy grew sluggish in the late '50s, concern over the impact of automation on employment opportunities increased as management stepped up its interest in the rapid introduction of technology. Unions were placed on the defensive and fought back by conducting holding operations: they sought to preserve the status quo ante. Holding the line on such things as manning, work rules, and loose wage incentive systems were hallmarks of the period. Management's strategy to seize the initiative at the bargaining table, deflate the size of the wage settlements, and bypass restrictive work practices contrasted sharply with union attempts to shore up job opportunities against the infringement of technological improvements, mergers, and plant relocations. It was a time of very heavy adversarial relations that created much work for mediators and arbitrators. And little thought was given to accommodations of any kind.

The controversies surrounding the issue of railroad firemen on diesel engines and the steel strike of 1959, that centered on the issue of management's right to introduce new methods and change job content, were illustrative of this type of conflict at the highest industry level. But day-to-day operations were similarly affected. Grievance records and volumes of arbitrations attacking or defending management's right to change methods or work assignments attest to that fact.

While labor-union leaders generally supported technological change in principle, they obviously feared its effects on their constituencies — effects that were, it seemed, out of their control. Faced with the inevitability of the machine, most union leaders felt that government and/or business should assume the responsibility for minimizing job loss and providing protection for workers and their communities.

Today, bargaining initiatives are taking on new dimensions in such private-sector industries as automobile, rubber, electrical manufacturing, and trucking and in the public sector at the town, city, and state levels of government (brought on largely by financial crises).

A new real politique is emerging, indicative of the fact that labor and management must recognize that technological change is a driving force that must be accepted and managed, and the frame of reference for bargaining today has to be wider than at any time in the past.

Management, faced with severe inflation and the soaring cost of energy, money, and labor, is trying to convince unions that they must recognize and be responsive to market pressures. It points out that the decline in the U.S. rate of productivity growth and the continued declining international competitive position of the U.S. should be a matter of concern to unions as well as to management.

In this context, management is bringing to the table a wider range of issues, especially issues related to increasing industrial efficiency. For example, management argues that wage determination should focus less on general wage increases, or cost-of-living provisions, and more on ability to pay relative to productivity. In exchange, management has to a greater or lesser extent been willing to alter its traditional policies. For years, Walter Reuther sought without success to see the books

of General Motors. Some managements, like Uniroyal in the rubber industry and Chrysler through Douglas Fraser's participation on the board, have opened the books in one form or another (sharing information about the condition of the company, joint committees, etc.). A host of others (U.S. Steel, AT&T, Western Electric, and GM, for example) emphasize efforts on the shop floor and seek joint decision making at that level.

Widening the scope of productivity bargaining faces serious obstacles. Productivity bargaining has always had negative connotations for employees. To labor, it suggests simply that management wins productivity gains by extracting concessions from unions.

The conventional wisdom among workers is that increased productivity means fewer workers — working harder. Union leaders and employees wonder why they should accept a speed-up when the current level of unemployment is high and the threat of lingering economic recession is in the air. A worker pessimistic about the future is clearly less likely to be cooperatively productive and more likely to resist change.

Traditional arguments over speed-up, however, assume a rather narrow, quantitative definition of productivity. Bargaining that is result-oriented must attack on a broader front, and includes issues of performance and quality.

In fact, gains have been achieved along this broader front. Recent productivity bargaining successes have involved mutual concessions, as has traditionally been the case in collective bargaining. While unions have yielded in areas such as wages and work rules, they have also won for employees a role in decision making and improvements in the quality of the working environment. The unions recognize that improved productivity helps secure its members' jobs while management realizes that employee input and job satisfaction can enhance productivity.

It can be argued that these successes indicate that collective bargaining as an institution has been able to adapt with flexibility and elasticity to the new, productivity-related issues that require labor-management cooperation.

Yet among employees and unions, productivity bargaining is still widely regarded as a deviation from — rather than a new dimension of — the traditional, give-and-take collective bargaining process. Management, on the other hand, is often reluctant to abandon its traditional prerogatives.

The strictly adversarial nature of collective bargaining in the U.S. has also been an obstacle to productivity bargaining. Labor has not been in any hurry to eschew its traditional adversarial role, nor has management backed away from the notion that the best results are obtained through "tough but fair" approaches to problems. The importance of exercising power and the definition of success in terms of winning and losing are deeply rooted in the American mentality and will not easily change. Adversarial-style negotiations still have their place, but for the kinds of things you people are talking about in this Workshop, a cooperative mode will have to be developed.

Because of the misconceptions and hesitation on both sides, we should be careful not to overestimate the velocity of the winds of change, despite recent productivity bargaining success achieved under the pressures of economic adversity. There is not a discernible rush to embrace productivity bargaining, in its new and broader sense, across the spectrum of U.S. industrial relations. There are reasons for this. Here a brief examination of some history may be helpful.

The classic examples of productivity agreements are the Armour Automation Fund (1959), the Kaiser Steel Long-Range Sharing Plan (1960), and the Mechanization and Modernization Agreement (1960) in the West Coast longshore industry. Attention has focused on the unique or at least uncommon local conditions that were incorporated into the agreements. Therefore, many observers have concluded that such agreements are not generally replicable because those conditions do not widely exist. But by going beneath the surface of local specifics, one can reach a different understanding regarding the critical elements that must be present if productivity bargaining is to fulfill the objectives of both sides.

I should like to illustrate this point through the West Coast longshore agreement, since I was an active participant in the negotiations for, and the administration of, that agreement. The main provisions eliminated outmoded work rules, permitted the introduction of new machines, changed unnecessary manning, and eased the introduction of containerization on the waterfront. Permanent employees gained job protection, early retirement benefits, guaranteed hours, retirement bonus above pension, and binding arbitration of all disputes arising under the new agreement.

In 1963, at a meeting of the Industrial Relations Research Association, Line Fairley, then research director of the International Longshoremen's and Warehousemen's Union (ILWU), listed the factors that he thought contributed to the success of the Mechanization and Modernization Agreement negotiated between the ILWU and the Pacific Maritime Association (PMA). He listed the following factors:

1. The existence of the hiring hall with rotational employment among all employees. The hiring hall more or less automatically overcomes the problems that would arise because of differential rates of productivity change from employer to employer. Work opportunity fluctuates for the entire work force, not for the employees of individual employers. It is difficult to see how, in a multi-employer industry, an M&M plan could otherwise be applied.
2. The machinery of joint registration, now existing up and down the West Coast. Without this, the parties could not have controlled the number of workers to the point where a plan to increase productivity could have been adopted. Where there is a surplus of workers, a union cannot agree to a program that forces some of them out of their jobs. Such a program is one of the employer's prerogatives. It is partly for this reason that the ILWU has supported other unions in their fight to maintain the types of rules that the ILWU and PMA were in a position to modify.
3. A rate of productivity increase that is not greatly (if at all) in excess of the anticipated rate of attrition or alternatively, of course, a sufficiently rapid rise in demand.
4. Agreement that the gains from the increased productivity effected by the plan shall be over and above the normal, expected improvements in wages and fringe benefits.
5. A strong union, with sufficient internal discipline to undertake its share in administering a radically new set of work rules and commanding sufficient trust from the rank-and-file regarding policies recommended by the leadership.
6. A correspondingly strong and effective employers'

association capable of handling its administrative functions and with sufficient vision to recognize that workers are entitled to share in the benefits of productivity increase.

7. An effective and flexible grievance machinery capable of handling without breakdown a heavy added burden and backed by a good faith willingness on the part of both sides to make the plan work.

My own experience with this agreement and its subsequent administration and my involvement in other cases of this type of bargaining lead me to make the following observations regarding Fairley's list. Looking only at the seven tests, observers from other industries would be troubled. For it would be impossible for any other industry to match exactly these factors, which are unique to the West Coast longshore industry. It would, therefore, be easy to dismiss the agreement as simply not applicable to other industries.

Many people who have been interested in that experiment have done just that, because the approach to the agreement taken in public discussions during the years following its signing was to concentrate on the mechanics: the interesting way in which the employers and the union approached the problems of the application of reverse seniority, the manner in which contributions were made into the fund, the way the voting was organized within the association, the difficulties with jurisdictional disputes on the docks, and a whole host of other problems that the parties dealt with in the negotiations and in the day-to-day relationships that followed. Observers were looking for mechanistic touchstones that would prove or disprove applicability to a particular situation.

But I think Fairley came closest in point seven to touching on the most important element making the agreement possible and sustaining it through many years of adversity, including a very long strike. There he referred not only to an effective and flexible grievance machinery (and it was all of that) but also said it must be "backed by a good faith willingness on the part of both sides to make the plan work." He concluded that "this last item is as important as any." I believe it is crucial, and I believe also that it is often ignored.

But while Fairley's view that the parties must have a predisposition to fairness and a commitment to make the plan work is fundamental, in the unpredictable world that inevitably follows the adoption of such agreements, it is not enough to have good faith representations at the initial euphoric summit. The basic underpinnings that must be 'present are more complex and subtle. Philosophically, both sides must support the continued existence of the other and assume that there is thus a need for a constructive, continuous relationship based perhaps on a new foundation. On the more mechanical side, there must be an active, ongoing structure for handling change peaceably — in the case of the longshore agreement, a complex and lively 'legal' system involving the use of continuous bargaining at the highest levels. Mediation and arbitration were key elements in that system. Overlaying this commitment to process was an enormous commitment of time on the part of corporate executives, association administrators, union officials at all levels, and outside third parties. Nothing less will do.

In 1963, at the same meeting at which Fairley laid out his seven factors, I presented a paper giving the management view of the agreement, which I entitled *The ILWU/PMA Agreement: An Experiment in Industrial Relations*. In it, I argued that although much so-called productivity bargaining takes place in an atmosphere of crises and name-calling, the crisis

is only a catalyst and cannot itself produce a positive, long-term result. Long-term prospects depend upon the framework of the total industrial relations climate: the culture of the industry, company, and union, attitudes of management and labor and the history of their relationship; and the interpersonal relationships of the participants. All these factors, plus the economic factors, will in the end determine whether or not the mechanics that are put in place by agreement will in fact work.

In applying all that we have learned from both past and present, my sense of the problem today is that in the rush to find the gimmick that will floor our Japanese friends, we fail to understand what elements have to be present in the relationship between management and labor before the two parties can deal with the new range of problems. I would suggest that at a minimum the following elements have to be present:

1. Management must accept the existence of the union. Each side is entitled to its own legitimacy. And if you people sitting here today think for one minute that this is a simplistic observation you are out of touch with what is going on. Because that fundamental fact only exists in a handful of labor-management relations that I know of today. Management must accept the existence of the union not only as an organization authorized to bargain for some or all employees in the enterprise but as a partner as well as an adversary. This involves the recognition that the firm's (as well as the employees') best interests are served by rendering to the adversarial procedure those matters that suit it best while at the same time developing a more humane, cooperative approach to the demands of the work place. Improving productivity qualitatively and quantitatively results from a new industrial combination, perhaps uniquely American. Workers receive respect through participation and protection through adversarial bargaining. Management gets results.
2. Management must recognize that very few matters will remain its sole prerogative once the union and its members are urged to share the burdens of success and failure, because employee involvement is an essential aspect of productivity improvement efforts. The span of control and participation by those not traditionally assigned management roles has to be widened and diversified. This involves difficulties in accepting new roles for both management and employees.
3. Union leadership must recognize that there is a risk in joining in the decision making process but that the alternatives — unemployment, layoff, downgrading — are clearly more frightening. It is entirely understandable that elected union officials have more difficulty than management over getting into bed. But elected union leaders, if they are really to lead, have to be concerned about the long-term interests of their constituents.

Under these kind of changed circumstances I think that productivity bargaining will look very different in the future than it has in the past. We are now facing a different technology — we are moving from a hardware technology to a software technology. The significance of some of the experiments underway at the present time will be whether or not these innovations can work. And if it is shown that it can be done in the auto industry, if it can be done in the rubber industry, if it can be done in the communications industry, then perhaps this will be the direction taken by most industries in the future.

But I think that the same threads which ran through the longshore agreement will have to be present in these other attempts as well. If I leave one thought with you today it is the thing that has troubled me most with many of these attempts to change the system and make it more competitive. It has to do with the legitimacy of both sides.

I'll illustrate this concern by recalling a fellow that I have made famous. He was a production supervisor I worked with when I was a small cog in the personnel department of a firm in Perth Amboy, New Jersey. George Dover was his name, and the principle I developed based upon my experience with George has come to be known as Dover's law. You see, George had one theme that permeated his working life — and that was his firm belief that if he was good to his wife and children (and I presume he was), and if he worked hard and went to church every Sunday, he would come in to work one Monday morning and the union would be gone. George went to his grave believing that, and I think a great deal of American management today believes that.

Discussion

Mike Gaffney Given an industry that is in trouble, and one that probably has its share of George Dovers, do we understand that you recommend no attempt be made to move in the direction of labor-management cooperative ventures? Or should such an industry take the risk and take tentative steps in this direction in spite of a less-than-perfect relationship between labor and management?

Wayne Horvitz By all means, take a chance. I tend to be optimistic, and I think the crises that many industries are currently facing will tend to make optimists of them as well. My message is not that you shouldn't try, only that you should keep in mind that you are taking on two jobs. On the one hand you are attempting to introduce your social technology program (quality circles, quality of worklife, sociotechnical systems, etc.), but you will also be faced with trying to improve the basic climate between labor and management. Don't make the mistake of thinking you will be facing only the first task. These things cannot be mechanically plugged in. I personally feel that the effort should be made to make these programs work. It is my concern, however, that inattention to the second task may result in the demise of such programs, or at least it will slow them down. I know of a major company in which the chairman of the board, president, and the entire industrial relations department have given no legitimacy to the quality of worklife program that has been instituted in the firm, even though they set up a special department to oversee the program and put two very good people in charge of the effort. One of the fellows in charge is a former plant manager who completely turned around a plant that was about to be closed by employing some of the methods you are talking about in this Workshop. The top management told him, in effect, that there may be something to this quality of worklife and that he should get on with it, but don't bother us with it. And in spite of this lack of firm commitment from on high, the program is doing some interesting things at some of the plants, mainly because they are faced with crises.

Gene Chambliss We were talking this morning about how American industry has gotten rather rigid, management in terms of its prerogatives and labor in terms of work rides (one

man, one trade). Do you see any hope of change with regard to the mixing of trades?

Wayne Horvitz Interesting that you should ask. I received a call the other day from a colleague in the oil business. This fellow had always maintained that there would never be an agreement in oil that would breakdown the rigid boundaries between the trades. He called to tell me that such an agreement had just been signed for one of the refineries in Houston. Actually there are two agreements involved. One is called the Universal Tool Agreement and the other is the Universal Work Assignment Agreement. The underlying principle is very simple. The Universal Tool Agreement provides a list of tools that anybody can use on any job at any time at the same rate of pay. The Universal Work Assignment Agreement, in effect, takes the relatively unskilled workers out of the crafts entirely. It lists the unskilled tasks that can be undertaken by anybody at anytime at the same rate of pay. This agreement proceeded from the recognition that many of the highly paid crafts were spending up to 40% of their time doing unskilled work. Union leaders are not ignorant of the need for reform in this direction: it is a matter of how such long-established practices can be changed.

Howard Bunch You mentioned in your discussion of the longshore settlement that this involved a change in attitude of only a small segment of management and labor. Can an entire industry be turned around if there is movement only in a small segment? Does there have to be some sort of critical mass before change can really take place?

Wayne Horvitz First let me make it clear that I was not suggesting that only a few executives and labor leaders in the longshore industry were involved in the M&M agreement. I meant that the M&M agreement was one of very few similar productivity bargaining agreements in the '60's. But let me address your question in the context of single-union, multi-employer industries. Company X may be at odds with the rest of the industry with regard to its labor practices. Other companies may feel that X is giving away the store, and refuse to follow X's example. Company X may continue on its own in such an environment, but employer peer pressure can be strong, and there is always the risk that it may fall back into the traditional mode. But it is important to understand that no industry's industrial relations climate could be more turbulent than that of the West Coast waterfront in the '50s. The employers played a very prominent role in attempts to deport Harry Bridges as a communist. So why did progressive change occur in that industry at that time? They had a crisis. The prices were outrageous and shippers were no longer using West Coast ports. Consequently, all the parties involved were convinced of the need for radical change.

Max Elden The concept of technology bargaining is gaining acceptance in Scandinavia, and in Europe in general, and in some cases is national policy. Are you suggesting that technology bargaining is a trend in the United States?

Wayne Horvitz American unions believe in two things: 1) that productivity bargaining will not lead to legitimacy for them (and there is considerable evidence that this is true), and 2) that technology is an uncontrollable force. This latter view that technology is determinant, even coupled with serious concern for loss of jobs, has resulted in American union positions that they have no business trying to steer technological change. Rather, they say they will react to it, once its

effect is clear, with traditional bargaining objectives and methods.

However, if Michael Maccoby and Glen Watts succeed at AT&T, if Pete Pestillo succeeds at Ford, if the GM people succeed, this will be very significant for you people in shipbuilding. Because if they succeed, the message they will be sending out at the very highest level is that it can be done. If that message has an impact on high level management and labor leaders in shipbuilding, it will make your jobs of introducing change that much easier. Until that high level message is received, however, you will have to be content with success in only those yards that currently enjoy high level corporate and union support.

WORKER PARTICIPATION

Xerox and The Amalgamated

Leslie Calder

For more than 50 years, as this group knows so well, the American labor movement has continuously pursued many objectives for the people we represent. We have worked long and hard to achieve safer, more humane working conditions, health benefits to protect our people from the physical and financial burdens imposed by disease and illness, retirement security, fair and equitable wages that would enable our people to share in the great American dream of adequate food, clothing, and shelter. The list could go on and on of what we have been able to achieve for our people. And I'm not here today to imply that we have achieved all that we dreamed. I'm hem-to mention only one important area.

I'm here to tell you that there is a final dream. A great dream that has been long unfulfilled during the past five decades. And that is the dream of true, meaningful co-participation with management. Co-participation in areas that only a short decade ago would only have been seen as a fool's dream. Co-participation in helping to identify problems within our companies; co-participation in helping to identify solutions to those problems. And co-participation in putting those solutions into practice.

The fool's dream ten years ago was to have an American workplace become, for the first time, a place of democracy, a place in which our workers' ideas, help, and expertise are eagerly and genuinely sought. Today I could stand before you and recount the litany of disasters that American industry has encountered in the past ten years — bad times and hard times that almost none of us could have envisioned. But instead, I stand before you today to say that I believe that American industry can rise from the ashes of the past to a place of unparalleled supremacy. And it can achieve that miracle, in large measure, by fulfilling, by making a reality, the last great dream of American labor.

And that is a dream of a workplace which truly, earnestly, and sincerely taps the now virtually untouched strengths, insights, and creativity of the American worker. Just three short years ago I would not be standing before you saying what I have said today. I say it to you boldly now. If we in labor, and those in management will summon up our courage and break out of the tradition of our past confrontational approaches, if we will join hands, although skeptically and with suspicion at first, and sincerely work to find a way to involve our workers, and really see them as intelligent, creative human beings, with vast untapped resources — if we do that, then I am convinced we can truly begin the process of building an American industry that will once again be the marvel of the world.

Why then do I say today what I would not have said a few years ago. Because I have seen firsthand in my own union and the Xerox Corporation what a genuine worker involvement program can mean — what it can mean to the solving of nagging problems, what it can mean to the improvement of productivity, what it can mean to worker morale and pride. I want to share today some of what I've seen in these last few years. To do that, I'd like for you to first think back with me to just a short decade ago, to a time before inflation, stagflation,

and severe foreign threats to our very existence. It was just about ten years ago that most of us heard for the first time, the expression quality of work life (QWL). Many of us were skeptical of QWL, this new process, this systematic approach being proposed by idealists to involve workers in their jobs. QWL, or employee involvement, or worker participation, whatever name you know it by, was a controversial topic in the American labor movement, and still is. But I hope to convince you that it need not be so, and I hope to do that by recounting what has happened to the QWL dream in the last ten years. and why it offers the kind of hope for American workers that no other cheap imitation has been able to offer.

Over this ten-year span, a growing number of unions have become involved with the QWL process some on their own, and others at the initiative of management. During the same time, opposition to QWL has grown stronger. The reason for the controversy comes from the fact that QWL challenges the traditional way in which unions do business. Because the QWL approach is based, first of all, on a cooperative problem-solving relationship between labor and management, rather than the familiar confrontational approach. Labor has sometimes also seen QWL as a process that will usurp the union's traditional relationship with its members. That fear has been fomented in some circles because there are cases where the implementation of QWL programs has significantly dropped the rate of grievances and has increased the amount of direct contact between employers and shopfloor workers. Many in the labor movement see these aspects of QWL as a threat to unions.

But there are others, including me, who see QWL as providing an opportunity for the extension of the collective bargaining process, as a tool for realizing labor's dream of bringing real democracy to the workplace. Many of you know, as I do, that labor has always been in the lead in the forefront of promoting the concept of democracy in industry. I believe QWL offers us the hope and the promise of making that goal a reality within the lifetime of many of us here today.

Now before I go further, I should take a moment to define for you what it is that I mean when I talk about QWL, because I recognize that it means different things to different people. In fact, some say it can't be defined since it takes different forms in different situations. But to me, QWL means simply this — the direct participation by workers in the day-to-day decision-making affecting their jobs. The heart of the QWL process is a system of problem-solving groups in which workers do two things 1) they define work problems, and 2) they propose solutions to those problems. Now I want to stress here that the QWL approach is vastly different, and should not be associated in your minds with the various quick-fix, gimmicky ideas that have popped-up from time to time, promising much and delivering little. These gimmicks, hot-selling as they may be, offer workers little beyond promises and rhetoric. And most of them, under whatever name you know them by, fortunately die a quick death in the workplace. The process I am talking about, whether it is called QWL or some other name, is different. It is different in many important ways. For one, it

involves a serious, long-term commitment to a change in management style. The QWL of which I talk is based on a philosophy of trust and respect for employees. Does that sound idealistic to you? Perhaps then you have not seen it at work as I have been fortunate to do. QWL is already a reality. It is already happening in pockets here and there across the country, sometimes with difficulty and with problems. But when labor and management begin to get even a taste of its fruits it becomes a force not easily shunted aside and forgotten. Because what emerges from even less than perfect QWL programs is a fundamental principle that we in labor have at least said that we believe wholeheartedly that it makes good business sense to treat workers with respect and dignity. At the same time, remember that we live in an environment of a rapidly changing economy, and with pressures from innovative foreign competitors quick to capitalize on our weaknesses and mistakes. In short, an environment that demands flexibility and quick response. Yet the traditional adversarial approach to labor relations produces organizations which are slow to adapt, and which are full of conflict. This is why our most successful companies are searching for ways to include employees in the decision-making process. The evidence is clear that meaningful employee involvement will continue to develop throughout the many sectors of our economy. This process of employee involvement is already becoming the way of the future.

Another reason this is true is that QWL types of processes lead to lasting improvement in job satisfaction among workers. If we in labor and management together respond to the challenge posed by QWL, it offers for unions and management the opportunity to deal with many issues that have been beyond the reach of traditional collective bargaining.

My union is one of a group of unions that are trying to develop a positive approach to worker participation. In 1980 we entered into an agreement with Xerox Corporation to create a joint QWL process. To be frank, we did not overcome workers' suspicions overnight. Those suspicions were based on the fact that over the years our members had to deal with one form or another of superficial employee programs. We've had communication programs, job enrichment programs, and others that have tried to boost morale and productivity. Some were not even serious attempts because they did not include fundamental changes in management style. The best unilateral effort of management was subject to suspicion because the absence of the union and the workers ideas and input weakened the necessary foundation of trust.

I think it is important at this juncture to tell you what QWL meant to us after three years, and how the program was established.

The very first step was the development of a letter of agreement which established the basis for the new QWL program. The letter established a joint policy committee at the manufacturing division level to develop the QWL process. This letter of agreement sets out the basic goals and the rights of labor and of management. Here are the agreement's key points:

1. QWL is a joint effort. The union is involved as an equal partner from planning to implementation and evaluation.
2. QWL is voluntary; for the union, for management, and for each individual worker.
3. Contracts and grievance issues are off limits.
4. No one can be laid off as the direct result of ideas generated from the participation process. You can't

ask the worker to suggest ideas that would put him out of a job.

5. The goal of the QWL process includes human consideration as well as economic efficiencies.

With the help of our consultant, the next step was to appoint coordinators or trainers in three participating plants in the Rochester area facilities. With equal numbers of coordinators from union and management, these people were then put through a three week extensive training program to learn the techniques of teaching employee involvement and problem-solving.

Then came the step of establishing advisory committees for each plant. These committees included the union shopfloor representatives who received special training in the QWL process. These plant advisory committees were charged with the responsibility of providing support and counsel to the QWL process operating within each plant.

Following that, we had orientation and information sessions with workers and supervisors, department by department. Then finally, we asked for volunteers to actually serve on the QWL teams that would be established. Those that came forward were given extensive training and were assigned to teams. The teams consist of 7-9 workers, including one supervisor and one engineer who is there for technical support to the teams. Each team was then trained for a total of 40 hours over a ten-week period. During this training period, each team selected real problems to be addressed.

I've attended a number of graduation ceremonies for these teams, ceremonies at which numerous solutions to work-related problems are presented. I have to tell you that I am still impressed by the excitement and the enthusiasm each team shows when they begin talking about the workable, meaningful solutions they have derived. Today, we have several teams operating in many different environments; in research and development, in maintenance, in distribution, in engineering, and in office settings. And similar teams are now in the start-up phase in Xerox operations outside of the Rochester area.

Now as some of you may know, 1982 was a difficult year for Xerox, and consequently for our union — because of the recession and the strong competition. There were, in fact, some reductions in the workforce, both in the union and the nonunion ranks. Against this backdrop, we also faced a serious problem at one operation in the wire harness department, where we in the union faced the possibility of the work being subcontracted because of the high cost of that department. In the Spring of 1982, the union and the management jointly agreed to form a wire harness QWL-style task force team, its objective was quite simple and quite formidable — find a way to reduce costs by \$3.2 million annually, or face having the work subcontracted. The team's task was to investigate virtually all aspects of the problem, direct labor, overhead, and equipment. In a matter of months, the team reported back with extensive recommendations. Many were immediately implemented, although others required changes in the contract language which was subsequently negotiated. The bottom-line is that this QWL-style team recommended cost savings of \$3.6 million annually, more than \$400,000 more than the original very tough goal. And today, 185 wire harness workers are **still** at work, still active and productive, feeding families, buying cars, and paying taxes.

This is but one example of how QWL can help preserve jobs and stabilize the workforce. For those who may be skeptical about QWL, three years may not be enough experience to convince you. But my view, and I think it is one that is

enthusiastically shared by our members who have actually participated in the process, is that it clearly benefits the union and its members. And one of the most important benefits for our workers is that it brings them a respect and dignity through having a voice on the job that they have never experienced before. But be forewarned. Once you give them something that touches at the very core of their humanity, you cannot easily go back to the old way of doing business. The process has also been valuable for the union leadership because it has given our officers the opportunity and the mechanism to work with a large percentage of our members that have rarely file grievances, but who nonetheless have concerns about the workplace. QWL then has significantly improved the level of communication between our leaders and the membership. If the QWL process has changed the attitudes of the workers involved, and if it has changed the role of the union shop representatives, then it has also changed the very nature of the relationship between the union and the company.

Now I would be less than candid if I didn't admit up-front that the changing nature of this relationship can sometimes be frustrating, and on occasions, even scary. The reasons for that, of course, is that those of us in labor, and our colleagues in management, are traveling in uncharted waters. In this respect we are no different than other explorers, for we almost intuitively know that we have few guides to help us on this path. We also know instinctively that if we are to be successful, we must work together from a base of trust and cooperation. Where precisely this changing role for labor and management will lead I do not think anyone can say with 100 percent certainty, but I do think that the broad outline is already emerging. And now I would like to close by giving you one man's view as to what this new relationship is going to be like. I believe that we, the Amalgamated, and the Xerox Corporation, at least are rapidly moving to a relationship in which management will more and more involve the union early on in major planning and policy consideration, seeking our ideas, our counsel and our help. Management will more and more recognize that union workers represent a tremendous wasted resource of talent and creativity, a resource crying out to be recognized and to be used — not in the old elitist paternalistic way, but in a new cooperative partnership way. We in the union must drop the old us vs. them mentality, and begin to genuinely help management bring new life and new vitality to our companies. In short, we in the union must begin to think and to act as though the company is ours, for if we do, we can make it so. To be blunt about it, I don't think we in the union, or those in management, have a choice but to pursue this new course, because we, like many of you face foreign and domestic threats that affect, potentially, our very survival. I believe that the QWL process offers more than just survival, however. I believe that it offers the opportunity to rebuild our companies and new enterprises unprecedented in the history of the industrial world. And I believe, that in the very process of doing that, we in American labor can bring about the fulfillment of that last great dream, to create a true industrial democracy, in which our people are raised from second-class citizenship to the level of full-fledged partners. That dream burns as brightly today as it did in the infancy of the American labor movement. But today, for the first time, you and I have the chance to grab the moment and make the dream a reality. Let us then, not be just dreamers of a dream, let us be builders of the reality.

Discussion

Ande Abbott If the situation arose, as I feel sure it must have, when 12-15 people volunteer for the 7-8 slots on a worker participation team, how do you handle the selection process?

Les Calder The Planning and Policy Committee sets those guidelines because it is their project. I believe in some plants we used a lottery system, in other cases I believe that the groups themselves elected their own members.

Howard Bunch You mentioned some opposition to QWL from the union side. Is that opposition in any way focused with regard to specific industries, or does it predominate on the local or national level?

Les Calder I think there has been a lot of resistance on the part of the American labor movement as a whole. This suspicion is to be found at the national level where there are questions as to the degree to which QWL diminishes the role of union leadership. Suspicion is also present at the local level where union officers and workers question whether QWL is just another gimmick or program to increase productivity with no payoff to the workforce. So the concerns of labor have had these two different perspectives, one of the workers themselves, and the other of their national leaders.

Howard Bunch Have the fears of that opposition to QWL been confirmed or quieted after exposure to actual QWL programs?

Les Calder It has been a mixed bag throughout the country. Some programs did just what the leaders and workers feared they would do. Others have proven to be a success.

Howard Bunch Would you say then that opposition is not more or less strident than three years ago?

Les Calder More and more unions today are taking a 'positive approach to worker participation than in the past. And if you remember some ten years ago, the auto workers were trying to start QWL programs and met resistance from management. Those companies have completely reversed their views now as a result of the crisis of foreign competition. So resistance from the management side has also been greatly diminished.

Peter Lazes A quarter of the unionized workforce in the United States, now have some contractual wording providing for worker participation. The major unions moving in this direction have been the Auto Workers, Communication Workers, Steel Workers, and now the Amalgamated.

Les Calder It is true that most interest in QWL is coming from the industrial unions which are faced most directly with foreign competition.

Howard Bunch I bring this up, because I understand that there is within the unions, a group that is very strident in their opposition to QWL. They may be a very localized group or small minority, but their comments are certainly not conciliatory with regard to QWL.

Jack Garvey I have two questions. Frequently in the last day or two we've heard how these small groups are formed. Almost without exception, these groups are composed of volunteers. Yet I would assume that at the shopfloor level, there are some workers who would be more desirable on these groups than

others. Has any thought been given as to taking on such people in a nonvoluntary capacity, hiring them to do the job, in other words? My second question has to do with the \$3.7 million savings achieved by the wire harness department. Where did that savings come from?

Les Calder Let me talk about the \$3.7 million first. We formed a task force of workers from the department, 4-5 plus some supervisors, one of the financial people from the controllers office, one engineer and one manager. Without asking for any cut in the employees pay, they came up with ideas on how to reduce overhead. Overhead can frequently be a significant part of the problem. I can give you examples of where we had 16 supervisors, and the task force recommended four supervisors could do just as well or even better. The maintenance costs were significantly reduced, training budgets that were not actually being spent on training were reduced, and an effort was made to reduce the amount of movement of people within the department. We had a system in which every move made within the department was made on the basis of seniority, whether it was vertical or lateral. Because the wire harness department was one of the lower classification jobs, it was always used as an area that people would only pass through. One of the changes made was that the department would become a separate line of progression which would prevent the walk-through of workers which had resulted in a number of inefficiencies of productivity and quality. We also agreed to use a temporary workforce to take care of the peaks of output and that these workers would be reimbursed at a lower rate for the three to five-month period that they would be in the plant. This contributed some \$3-400,000 in cost savings. So by solving some of the overhead cost problems and by changing the contractual work rule problems, we were able to achieve the overall savings of \$3.7 million.

As to the issue of using non-volunteers in this program, we are starting to think about that because after 3 years, the rate of volunteers has dropped off as the process becomes institutionalized. We think we may require all employees to be trained in QWL, but we will probably still retain the voluntary aspects of participation. We feel that if they are exposed to the values of employee involvement, they will want to participate and we won't have a volunteer problem.

Peter Lazes The head of industrial engineering for Xerox Manufacturing was a very key resource to this group. He made a public statement that he is convinced that his engineering group could not have come up with the kind of cost savings the team came up with. Parenthetically, one of his staff members was on the team, but what he was saying in his statement was that the combination of technical people and shopfloor people was the key to making this happen, that if he had done it unilaterally within his department alone, they could never have gotten there. He has now created a workshop to train his engineers how to operate in this fashion in other assignments.

Jack Garvey What about the 12 supervisors?

Les Calder I don't know that they were laid-off. They may have been transferred to another department.

Jack Garvey With regard to the overhead savings, that sort of poor billing or budgeting is the sort of thing the department head should have been fighting with his management about. Maybe it was corrected in this case, because the presence of the task force gave him some additional muscle to get higher levels of management to slack off somewhat. This sort of use of the workforce in problem-solving is a bit different than what I had

expected. I thought employee-involvement had to do with solving technical problems at the worksite, not in correcting accounting problems.

Les Calder This group also made many suggestions for improving work flow and the more traditional sort of recommendations that come out of an employee involvement group. I made mention of the overhead focus because it is rather unusual.

Mike Gaffney This is a very important point, though. Yesterday, Dan was talking about the Saab plant and the difference between a Detroit-style assembly line, and a Saab approach to a small group building an entire car. Dan made the point that the cost of building a car in this new fashion was about the same in terms of direct labor hours. Two years ago, the president of Volvo, Per Gylenhammer, was testifying to Congress on this subject of the human factor in innovation productivity, and that point was put to him — how could the company be so keen on this new way of working if their experience, like Saab's, was that the labor cost was about the same as in the traditional assembly line. His reply was that this fact did not take into account the very substantial savings realized through minimization of overhead with self-managing workgroups. The same fellows that are putting the cars together, are lining up their own vacation schedules, arranging for their own training.

The same thing is true for merchant ship operation. When Northwest European operators reduced and reorganized the crews on their vessels they found that a major source of savings was a reduction in the staff shoreside, because the ships were now being allowed to operate pretty much on their own. The ships' crews became self-managing.

So it is not always a case of win/win. People are let go, but they may frequently be let from middle management ranks as the shopfloor production workers take on responsibilities previously held by these intermediate levels of management.

Peter Lazes The challenge is to find ways of employing these people that are made redundant.

Howard Bunch Then is it true to say that QWL is most effective in organizations or industries in which there is some capacity to absorb displaced workers in other capacities? Because I don't think this capability is present in U.S. shipbuilding.

Gerry Swanson It hasn't been a problem at Lockheed, but then we've been on a growth curve for as long as the program has been in force. We've gone through a minor downturn, but no significant downturn.

A COOPERATIVE PROGRAM IN SHIP- BUILDING SOCIAL TECHNOLOGY

Michael Gaffney .

As described in the Introduction, this Workshop has been structured to allow for presentations and discussion on four topics in a specific order. That sequence of topics has enabled us to pursue a logic which brings us to this final session. To summarize:

- 1 If it is agreed that the U.S. shipbuilding industry is currently presented with problems (and opportunities) which have a substantial human resource element . . . and"
- 2 if it is agreed that there are specific techniques (social technologies) which hold promise of significantly improving the condition of the shipbuilding industry and of its workforce . . . and
- 3 if it is clear that the previous two assumptions are held by a number of yards which are either currently undertaking, or considering, the application of some of these techniques . . . then
- 4 what might be the merits of a program in which a number of yards —
 - at the minimum, share information as to successes and failures with specific techniques or approaches to specific techniques . . . and
 - more ambitiously, initiate, monitor, and evaluate sponsored research designed to fill information gaps, information that would be of value to the industry as a whole?

Expanding upon these two potential functions of a cooperative program in shipbuilding social technology, let me recall a metaphor introduced the other day by Les Calder. He said that his union and Xerox Corporation were sailing in uncharted waters — in the sense that they have not had a lot of data on these techniques that are the subjects of their experimentation. To mix metaphors, they are breaking new ground, both for management and for the union.

I'll take that maritime metaphor a bit further. There are two solutions when a mariner finds himself in uncharted waters. To solve his immediate problem, he takes on a pilot, somebody who has been there before and has local knowledge of channels and shoals. Pilots are not scientists or cartographers, or even formally trained navigators. They are frequently natives who possess no chart or instruments, but do have the one thing of which the mariner is most in need at that moment—local experience.

In the same fashion, if a group of yard managers and union leaders seek guidance on this subject of shipbuilding social technology, the most immediate assistance would be the local knowledge they have to impart to one another. There are a number of naval and commercial yards that have some form of social technology experience, whether it be quality circles, quality of work life, or even autonomous work groups. That knowledge is not always quantified, but it is valuable nonetheless, especially to those yards which are facing similar problems. Therefore, at a minimum, a cooperative program would allow shipyards and their unions to be their own native pilots.

The longer-term solution to the mariner's problem of uncharted waters (presuming that he expects to sail this route again frequently in the future) is to construct a chart. And a cooperative research program can serve this purpose as well. By planning, funding, monitoring and evaluating research, a number of yards and unions can fill in information gaps where local knowledge is insufficient — where there are no pilots.

As mentioned earlier, a number of groups (National Academy of Sciences, IREAPS, Ship Production Committee) have suggested that such a cooperative effort would be a worthwhile application of both industry and government resources (people and money). But the proof of this lies initially with the principals, shipbuilding management and labor. Only you can decide whether these parties wish to establish such a network, and only then can the role of government sponsorship be considered.

One of the objectives of this workshop has been to consider whether the yards may wish to form such a network. In considering this question, it may be useful to review examples of cooperative social technology programs in shipbuilding and in other industries, both in this country and overseas.

Within the United States, there are a number of organizations whose function it is to develop and refine social technologies, and to spread the word. Specifically, they provide industry (labor and management) with the following services:

- A Training (seminars to familiarize individuals and organizations with social technology concepts) -
- B Consulting (practitioners to assist with projects within firms)
- C Networking (structured continuing association of individuals and organizations with interests in social technologies)
- D Research (may or may not be undertaken in conjunction with change programs)
- E Publishing (books, monographs, newsletters)

A sample of such organizations follows with identification of their respective program concentrations:

- . American Productivity Center B . C
- . Work in America Institute A,C,E
- . Program for Employment and Workplace Systems/Cornell A,B
- . American Center for Quality of Work Life
- . Institute for Social Research :
- . state quality of work life centers (several) B
- . regional labor-management committees (several) C
- . D.O.L. Cooperative Labor-Management Program . . A,E

In terms of the industrial populations served, the above organizations are either generalist (any and all industries) or regional (state QWL centers, and community labor-management committees). Regional efforts are a distinctly American invention. Though these generalist and regional groups meet a continuing need, it is becoming apparent that many of the most significant social technology changes are industry-specific

either in content or with regard to diffusion. This is due to industry-specific commonality of technological, institutional, and historic factors, and the switch from a focus on job satisfaction in the 70s, to economic survival in the 80s.

There are currently some industry-specific labor-management and social technology programs in place in the United States. But they are either regionally based (construction, railroad, police and fire) or have a single union focus (coal, masonry, men's clothing) (Department of Labor 1983). The retail food industry has a multi-company, multi-union program, but it deals predominantly with traditional labor-management subjects (facilitation of collective bargaining, preventing strikes, promote communication on issues confronting the industry) rather than concentrating on social technologies. Although the industry-specific social technology orientation has not been prominent in this country, it has been quite successful in Europe. Witness the ship operating industry throughout NW Europe and Japan, and (more recently) shipbuilding in Norway.

Merchant vessel operation has been the subject of social technology experimentation since the mid 60s. Norway chose it as one of the first target industries under the Industrial Democracy Project, and in England, it was subject of considerable research since the Esso-Tavistock experiments in the late 60's. At about the same time, individual companies in Sweden, Denmark, the Netherlands, West Germany, and Japan also began to experiment with new forms of crews. This has continued in these countries throughout the 70s and into the 80s. The consequence of social technology experimentation in this industry is the institutionalization of merchant ships crews of dramatically reduced number and function. Largest ships in these countries are now operating with crews of 18 (down from 45 in the 60's) consisting of general purpose (multi-purpose) ratings and semi-integrated (multi-purpose) officers. These crews have greatly expanded responsibilities and operate fairly independently of their home offices. Levels of training, wages, benefits, and job satisfaction have risen, and the changes have allowed these vessels to remain competitive and operate under national (cf convenience) flags.

For purposes of research, information exchange, and diffusion, cooperative (multi-company, management-labor, and industry-government) social technology programs in shipping have formed in a number of these countries. The best known are the Sealife Programme and the 80s Group in the U. K., the Shipping Project in Norway, Provo in the Netherlands, Ship of the Future in W. Germany, and the Committee on Modernization of the Seafaring System in Japan.

The Sealife Programme was a 5-year effort involving a number of U.K. shipping companies and unions. It was organized and largely funded by the General Council of British Shipping, the operators' trade association. Other funding came from the U.K. government. The program conducted basic research, action-research (a number of experimental ships), held frequent workshops and published widely. A similarly constituted (though not separately funded) group of U.K. operation known as the 80's Group still meets regularly to compare notes on continuing experiments begun during the Sealife period.

The Shipping Project of the Oslo Work Research Institutes has remained very active in Norway for the past 20 years. It has provided researchers to ship operators interested in experimenting with new management practices and organizational forms of crews. These researchers are paid by the government, although all research expenses (travel, equipment) are borne

by the individual companies making use of them. Both owners and unions credit the Shipping Project for the role they have played in assisting the industry to remain competitive while improving the quality of life at sea.

In the Netherlands, it is the Maritime Research Institute, Netherlands (MARIN), that is assisting both ship operators and shipbuilders in organizational development projects. Shipboard organizational change has progressed so far in Holland that the only entry training available for ratings is as general purpose (GP) seamen. Separate deck and engine ratings are rapidly being phased out. Not much further behind is the implementation of semi-integrated officers, eliminating the traditional distinction between those two departments at the level of licensed seamen.

In Germany, the shipbuilders, ship operators, and their unions are cooperating in a large government-sponsored project to design, develop, build, and operate highly rationalized, automated merchant ships, both for the German flag and for export. The Ship of the Future project entails organizational development experimentation aboard ship and within the shipyards.

In Japan a similar large-scale government-financed research program is underway to improve productivity, safety, and quality of life at sea. Again, involving a cooperative effort on the part of many companies and unions, the Committee on Modernization of the Japanese Seafaring System is assisting with research on (in 1983) 65 experimental ships.

In Europe there is even one network which crosses national boundaries, a group of operators and their unions from several companies meet regularly to review and compare their social technology experiences of the past year. The point is, that these experiments are continually breaking new ground and that there are no textbooks or courses of study to guide these companies and unions. They are the experts and it is primarily through face-to-face exchange of information between these principals that organizations are able to capitalize on any experience or knowledge other than their own.

Overseas shipbuilding is another case in point. Back in the 60s, the Japanese yards compared notes through the Japanese Union of Scientists and Engineers, as they took the first steps in experimenting with small groups, an innovation which became the foundation of modern Japanese shipbuilding workforce organization. In Norway, Nine yards have been engaged in a cooperative social technology program coordinated by the Royal Norwegian Institute for Science and Technology - NTNf (Norway's equivalent of the U.S. National Academy of Sciences).

But given the fact that we have a number of examples of cooperative social technology programs overseas (even in shipbuilding overseas), and in other industries in this country, are there good reasons to undertake a cooperative (multi yard, management-labor, industry-government) social technology program in U.S. shipbuilding?

Here are a few:

1. Partly due to the efforts of generalist and regional social technology programs, there are now a number of yards (perhaps as many as a dozen) that have some experience with (as much as 5 years) social technology programs. The initiation of a cooperative program would be made easier by the participation of a number of yards that already have this experience. The fact that we have this many years participating in this workshop (and others who indicated an interest in the subject

matter) is an indication of readiness on the part of industry.

2. Although organizational change can proceed on the basis of only a willingness or desire to change management style or corporate culture, it is also frequently caused or encouraged by simultaneous technological change (facilities, tools, production processes). The U.S. shipbuilding industry is currently entering a period of significant technological change—from a functional to product-oriented work breakdown structure. The time is ripe for corresponding organizational change. Other shipbuilding technological changes will open up organizational design options (e.g., CAD/CAM, flexible manufacturing systems, design/production integration, robotics).
3. There is already in place a structure for industry cooperation in productivity-related activities—the various panels of the Ship Production Committee (National Shipbuilding Research Program). This might be a good location for a shipbuilding social technology program. There is a government sponsorship structure in place, and it would keep the social technology program firmly embedded within the technological innovation side of the industry. Other SPC panels are currently working on such topics as CAD/CAM, design/production integration, flexible manufacturing systems, and it is largely through this program that product-oriented work breakdown structure has been reintroduced to the U.S. yards. To the degree that a shipbuilding social technology program would be concerned with the organizational ramifications of new shipyard engineering technologies, this “would seem to be the logical location.

One essential requirement of a cooperative social technology program is the willingness to share information and views—between companies, between unions, between labor and management, and between industry and government. The potential for this sort of communication among these parties is not clear. It appears that labor-management relations in shipbuilding may be sufficiently stable to allow for a non-adversarial exchange between most companies and most unions. The number of quality circle and quality of work life programs underway attests to that. It would also appear that jurisdictional disputes between unions is not a problem, one that would stand in the way of multiple union participation. As to the propensity of companies to share information among themselves, and with the government, they are doing it now within the auspices of the National Shipbuilding Research Program. It is true that the current program has an engineering focus, and companies may be more sensitive on matters of workforce organization, but those companies that have been involved with these techniques have not thus far been chary of discussing them in public forums. Quite the contrary, there are indications that the yards take every opportunity to talk about what they are doing.

That is not to say that these yards have been telling all. In any industry-specific cooperative research program there are limits to the type and detail of information divulged. The proprietary interest of the firms must be protected, and in the case of shipbuilding this means principally the confidentiality of man-hour statistics. It should also be realized that, unlike the overseas industries earlier mentioned, the U.S. shipbuilding firms are competing largely amongst themselves, and not as a group against foreign competition. And with the loss of

construction differential subsidy, threat to Title XI, the general commercial shipbuilding depression, and now threats to the Navy's shipbuilding program, there is a shrinking domestic pie to be apportioned among the yards. Consequently there is no question that firm ground rules will have to be in place to protect proprietary interests.

A shipbuilding social technology program might perform any number of functions earlier identified with generalist and regional programs (i.e. training, consulting, networking, research, and publication). Perhaps most important, however, would be the establishment of a structured network between individuals and organizations involved in, or considering, human resource innovations in shipbuilding.

Additionally, the program might serve to link the shipbuilding social technology community to other sources of useful information. For example, the program (through site visits, trip reports, translations) could keep U.S. yards in touch with social technology innovations in shipbuilding overseas. It could also link the shipbuilders with what is happening in other U.S. industries (the generalist social technology networks would help here (e.g., Work In America's Productivity Forum, Department of Labor, etc.).

Another important function might be the sponsorship of research projects. For example, a shipbuilding organizational behavior simulation might be undertaken as was done in Norwegian shipbuilding (The Norwegian Center for Organizational Learning - NORCOL). The simulation provides executives and supervisors with a safe opportunity to contrast the effectiveness of various management styles before deciding on whether they wish to modify their own organization for real. Most projects, however, would likely entail the undertaking of specific action-research efforts within individual yards. Yard A might experiment with a multiple skill job classification for the trades, while Yard B examines the merging of production and integration responsibilities among middle managers. Yard C might gauge the effectiveness of a behavior modification program for welders, while Yard D compared the effectiveness of single craft versus multi-craft quality circle membership. Yard E might experiment with the introduction of semi-autonomous work groups in a flexible manufacturing environment.

But the essential function of the program would be to provide this continuing network of shipbuilding social technologists, both from management and labor ranks. The program, through meetings, workshops, site visits, research projects, newsletters, publications—would facilitate the exchange of information among these individuals, and between them and the larger overseas shipbuilding and U.S. non-shipbuilding social technology communities. In this regard it would not be a research program in the narrow sense. It would be a productivity/safety/quality of work life program designed to establish and solidify mechanisms for human resource innovation in the U.S. shipbuilding industry. As an industry-specific, multi-company, multi-union concern, it would be something new on the U.S. scene.

Discussion

Bill Batt Just a few additional notes on industry-specific programs. A shipbuilding program might benefit from an examination of what has been happening in this regard within the steel industry. The best single source of information on steel is a chapter on industry level cooperation in a recently

published book by Ed Weinberg and Irving Siegel. An appendix includes the text of the facilitating agreements between U.S. Steel and the Steelworkers, and between AT&T and the Communication Workers of America. We've been fortunate to have with us at this Workshop, the expertise of some representatives of Bethlehem Steel.

Another place to look is the International Masonry Institute which was formed at the initiative of the Bricklayers Union. This activity got started after the Lundine-Javits Bill was passed, establishing labor-management cooperation as a national policy, that which ought to be encouraged as a management objective. The Lundine-Javits Bill hasn't been mentioned in this Workshop, but it is certainly part of the history of this sort of activity. The Bricklayers have been doing a number of innovative things under this one roof (apprenticeship, stabilization of employment, seasonality, productivity, and industrial peace). They have also initiated a quality of work life program which they are just now feeling their way into with the assistance of a consultant from Harvard Business School. They are also going after market share, and many of you have heard the Brick & Block commercials that they sponsor. I recommend that you talk with Jack Joyce, the President of the Bricklayers.

The railroad industry quality of work life program is another that should be looked at, especially for shipbuilding/shiprepair which is also characterized by significant government involvement. The participation of the Federal Railroad Administration in that program might serve as a model for the participation of MarAd in this proposed activity.

John Roper I believe that this kind of proposed program is sorely needed in this industry and in this country.

James Acton I would suggest that the next action to be taken to bring this program about be something similar to what the SP8 Panel has done. We've had excellent success with a series of workshops given on a regional basis. Once SP9 approves the content of such a series of workshops, you could solicit the shipyards to see if they would like to be paid a visit. Our experience (SP8) has shown that a very good attendance is obtained in this way. Yards simply cannot afford to send a number of people across the country to participate in these national workshops. Workshops given locally, however, might even catch the attention of the CEO. I think it would be a very worthwhile follow-on to the workshop we've just completed.

Joseph Flynn I share Jim's view as to the value of a mini-workshop approach, but recommend that you not pursue this course immediately. It is a matter of timing and frequency. I think that there is very little we could do to make any program such as this attractive to our CEO's immediately — somewhere down the line, yes. First give us a chance to make our reports to management and inform them of all the good things we've learned here. In 6-8 months from now (May) a series of local workshops on this topic, directed to the CEO's attention, would be very useful.

Gene Chambliss If anything negative could be said about this workshop, and I know the constraints involved, it is that we didn't have more representation by the unions. Perhaps the concept of the regional workshops would enhance this missing element.

Max Elden The mini-workshop approach would also involve more levels of management than could be represented at this national workshop.

Ande Abbott A number of unions whose companies are engaging in this sort of research/experimentation are taking a step backward from it with a wait and see attitude. They want to see how it works out before they bestow their stamp of approval. Other unions see this activity as somewhat of a threat in that there is a stigma attached to projects similar to these that have been consciously employed in attempts to break unions. I would like to have seen more unions here and it could be in some cases that they need more education.

I agree that this program should be developed. But it should be done in a very constructive way that will build the necessary trust.

Peter Lazes This is a critical issue that we've been concerned with at Cornell — that the unions don't have enough coaching and guidance about how to pursue these activities. We are working with some national and local unions that are very eager to learn as much as possible about this subject. I think the unions might be quite receptive to the regional workshops, especially if they were presented by an organization that was perceived to be neutral and was trusted by the unions. With such an approach, I think there would be only limited problems in getting local union leadership to participate in the program.

Ande Abbott I think that is a very good point. I know that some of the best programs the unions have ever participated in are those hosted by USC, UCLA, Cornell, Michigan State and Wisconsin. We have trusted them and when they put on a program we like to attend. But I would just point out that on this particular topic there is an additional problem having to do with the sensitive nature of the topic. The locals don't have much money and the leadership is cautious about spending money to travel some distance to go to a conference on a topic that may be questionable to the members. If the workshops are given locally, the leader can take along a few members with him so that he is not suspect when he returns with a recommendation to get involved in such activities. Then it isn't his recommendation alone.

Michael Gaffney As I mentioned earlier, there are a number of unions, local and national, which did not attend this workshop only because they didn't get the word soon enough through the nationals, or didn't have the funds, or had to testify at the Boggs Bill hearings.

Ande Abbott Yes, it may be necessary to provide the locals some financial help to travel to these national workshops.

Steve Sullivan Well be able to respond more directly to the question of the advisability of a continuing program once we've had the opportunity to tell our principals what this Workshop has been all about, especially after we get a feeling for what the union response will be. Their participation in such a program is very important to Bethlehem. I know that the Sparrows Point local would have been here today if they had received an invitation.

Michael Gaffney These recommendations have been very helpful, but what has to come at the end of this Workshop is only an indication of what you would like to happen next, if anything. No formal commitment is necessary at this time, only an expression of interest or disinterest.

Howard Bunch What we need to have now is your gut feeling as to whether this is an area that should be pursued.

George Roper Congress is looking to the shipbuilding industry to show some movement of positive self-help in this area, and this would be an excellent way for us to show some evidence of self-improvement. I think we should do it.

Jack Garvey I've been counting heads, and we've heard from everybody but Lockheed and Ingalls. I'd like to hear what they have to say.

Gerry Swanson Lockheed has been in favor of this sort of information exchange all along. Several yards have come to visit us in Seattle, and we've visited a number of your yards. Clearly, Lockheed's policy has been one of willingness to share although I cannot commit my company to this specific program proposed today. I do feel that it is very probable that Lockheed would participate.

Bruce Bradley I feel that my company would go along with such a program that would benefit the industry.

Michael Gaffney With regard to the use of such a program to generate support in Congress, my initial reaction is that it is, in one sense, the very worst of reasons. Yet the industry finds itself with something of a chicken and egg problem. The social technology solutions we have been talking about for the past 2 1/2 days stand no chance of producing long-term results unless there is an order book and stability of employment. Yet the current environment is such that those orders will come initially only with government involvement in some form or another. It will take some time before this industry can get competitive again. If a genuine, serious social technology cooperative program served as evidence to government that shipbuilding management and labor were committed to thorough review of organizational and work practice issues (with the objective of greatly improving productivity), then that would be a further, legitimate service to the industry. A number of other American industries are taking this tack (auto, steel, consumer electronics).

Ande Abbot There is a large group of congressmen and senators who are critical of any legislation that might be supportive of the maritime industries. Their argument in working against this legislation is that it will lead to no meaningful changes in that the industry is not even trying to get competitive on its own, not lowering costs or trying new techniques. We hear this constantly. One of the things this proposed program can do is to bring to the attention of government what Lockheed is doing, what Bethlehem is starting, etc. I don't think the public information value of the proposed program should be played down. Obviously it has first to be a technical success, but it can help in the political arena as well. Management and labor leaders have to come to understand that it is not enough any longer to rely upon the sole argument that the country needs us for the next war. We have to become efficient operators and rest our case on that as well. This program could help achieve that.

Jack Garvey Before we get too enthusiastic, I would like to know what the Untouchables are — those areas that should not be touched by this proposed program with a ten foot pole. For example, some of these topics bear upon labor-management agreements. Won't these projects impinge upon the collective bargaining process?

Ande Abbott Eventually, but that need not be a problem once trust is established between the labor and management parties.

Michael Gaffney The degree to which social technology innovations conflict with negotiated labor practices varies and is variously handled by the managements and unions involved. Sometimes a variance is given to permit experimentation with a practice that is contrary to the current agreement. In other cases the capability to grant variances is an addition to the contract language itself. Bill Batt mentioned the provisions of the agreements for the Steelworkers and for the CWA. In other cases, the parties limit themselves to innovations that do not impinge upon the language of the contract. The process of social technology experimentation is not ipso facto a contradiction to collective bargaining. Rather, it is a supplementary labor/ management endeavor, newly developing. One of the benefits of a cooperative program could be the assistance it might render to managements and unions in feeling their way in this new area.

Jack Garvey What about the degree of information sharing? Lockheed has gone about as far as any yard in this field and I'm sure that there are a number of other yards which would just love to take a look at some real hard data on Lockheed's productivity gains. But will Lockheed be willing to release this information?

Michael Gaffney I don't know. As I said in my presentation, there is a limit to information exchange in any cooperative research program and I don't imagine that this one would be any different. It would have to be worked out, especially for those projects in which some government money was involved. I am sure that there will be some degree of protection of proprietary data. I wouldn't expect companies to throw open their books to their competitors. It is a matter that would have to be addressed by the industry and government partners in the proposed program.

Jack Garvey Let me raise one other point. I have the feeling that every yard sitting around this table would love to have one or more of these projects underway — if it didn't cost them anything. From the government's perspective, I can tell you that industry is going to have to contribute to this program as well. Cooperative program means just that; industry must be willing to pay its share.

It is really more than an economic issue or question of cost-sharing. It has to do with credibility. If government funds this whole program then that is how it will be perceived by everybody — as a government program. In addition to reducing the chance of technical success, an overly large government presence would limit the public relations value mentioned earlier.

Ande Abbott At the same time, it seems to me that this is precisely the sort of program that government (MarAd and other agencies) should support. It is in the best interest of the country.

Jack Garvey Please don't misunderstand me. It would be too easy for me to make it a government program, and too easy for industry not to put any money into it. I think this should be a joint program. I think the government has a clear role, especially in the start-up years, and we've done this many times before in the more exclusively technical research areas. My point is that it must become an industry program.

George Roper Do we need to do more now than to give an indication that we would like this to be pursued further? Do we need to go into detail at this point?

Jack Garvey No. Michael has asked for an indication of interest and short-term direction, and I believe you have given him that. SP9 and the National Shipbuilding Research Program will be providing some funding for the next several months to get some discussions started with sponsors and a plan of action on paper. This will be put on the table in front of you and your companies sometime before the end of the summer. Let's agree to meet in a couple of months to work these thing out. set up a task group to hash out these details brought up today. The IREAPS meeting will be held in Boston in August, and it might be a good opportunity to meet for a half day or so to resume this discussion.

CLOSING REMARKS

Howard Bunch

I must tell you that I am very well pleased with what I've seen here in the last 2 1/2 days. Many of you are old acquaintances of mine, some I've met for the first time and for that reason alone it has been a pleasant experience for me.

Equally as pleasant, though, is the fact that we've brought off what appeared to be, some months ago, an extremely delicate conference. And we have Mike Gaffney to thank for his tenacity, hard work, knowledge of the subject, and selection of an excellent faculty.

The Workshop had four objectives; 1) to review human resource problems and opportunities in shipbuilding, 2) to

discuss potential social technology cures for these problems. 3) to consider how these innovations maybe introduced into U.S. shipbuilding, and finally 4) to consider whether or not a continuing program of networking and research in shipbuilding social technology should be instituted.

As representatives of your yards, you will now be returning home to discuss the Workshop with your colleagues. Hopefully, the conclusions and recommendations of your discussions will be passed back to me, or to the Ship Production Committee, so that we might have direction on how to proceed with the social technology initiative.

REFERENCES

- A & P Appledore
1980 Development of a Standardized U.S. Flag Dry-bulk Carrier: Innovative Analysis of Cost Cutting Opportunities. U.S. Department of Commerce, Maritime Administration.
- Bell Laboratories
1983 Personal communication with managers.
- Bradley, Richard
1981 Quality Circles, Doing Business Better at Philadelphia Naval Shipyard. Proceedings of IREAPS Annual Symposium, 369-376.
- Brayton, W.C. et al
1973 Study of Welding Technology in Japanese Shipbuilding. U.S. Department of Commerce, Maritime Administration and Bethlehem Steel Corporation.
- Bureau of the Census
1973 Census of Population — 1970, Industrial Characteristics. PC(2)-78, Washington U.S. Government Printing Office.
- Cole, Robert E.
1979 Work, Mobility, and Participation A Comparative Study of American and Japanese Industry. Berkeley University of California Press.
- Colton, Tim and Yukinori Mikami
1980 The Shipbuilding Technology Transfer Program Bringing Japanese Shipbuilding Ideas to U.S. Shipyards. The Society of Naval Architects and Marine Engineers. New York Metropolitan Section, May 22.
- Cooper, M. R. et al
1979 Changing Employees Values Deepening Discontent? Harvard Business Review, January/ February, 117-125.
- Davidson, William H.
1982 Small Group Activity at Musashi Semiconductor Works. Sloan Management Review, 23,3:3-14.
- Denisen, Daniel
1982 Sociotechnical Design and Self Managing Work Groups The Impact on Control. Journal of Occupational Behavior, Vol. 3:297-314
- Department of Labor
1983 Resource Guide to Labor-Management Cooperation. U.S. Department of Labor, Labor-Management Services Administration. Washington: U.S. Government Printing Office.
- Dore, Ronald
1973 British Factory — Japanese Factory. Berkeley University of California Press.
- Elden, Max
1983 Technology is Not Enough. Trondheim Institute for Social Research in Industry.
- Flack, J. and J. Nichols
1980 Education and Training for the Ship Repair Industry — Present Situation and Future Trends. Transactions of the Institute of Marine Engineering, Vol. 9231-38.
- Fox, Michael
1980 Japanese Lesson is Union Leader's Recipe for Peace. Lloyd's List, October 3:2.
- Gilbride, John T.
1982 Remarks at Plenary Session, Navy Shipbuilding Technology Conference. National Academy of Sciences, Washington, June 28.
- Goodman, Paul
1979 Assessing Organizational Change. The Rushton Quality of Work Experiment. New York: John Wiley and Sons.
- 1980 Realities of Improving the Quality of Work Life Projects in the 1980s. Labor Law Journal, August, 487-494.
- Hartigan, John
1982 Personal Communication. Hartigan is Director of Shipyard Training for the Naval Sea Systems Command.
- Hayes, John P.
1982 Remarks at meeting of Ship Production Committee Panel (SP-9), Education and Training, Seattle, August 11.
- Hayes, John P. and Gerald C. Swanson
1981 Quality Circles at Lockheed Shipbuilding. Proceedings of Conference, Innovation for the 80's — A Shipbuilding and Repair Symposium, 89-106, Seattle, September 17-18.
- Hill, Roy
1973 The Company that Publicized its Shortcomings. Management Review, July50-53.
- IREAPS
1982 Five Year Plan. Institute for Research and Engineering for Automation and Productivity in Shipbuilding.
- Journal of Commerce
1982 September 212A.
- Kockums
1970 Kockums Report. unpublished company report.
- Lake, D.
1983 Personal communication.
- Lazes, Peter and Jim Laird
1982 Personal communication. Lazes was external consultant to the project and Laird was project coordinator.
- Lowry, Robert, William Stevens and John Craggs
1980 Technology Survey of Major U.S. Shipyards. Transactions of Society of Naval Architects and Marine Engineers, Vol. 88:151-172.
- Marine Equipment Leasing
1979 Technology Survey of Major U.S. Shipyards — 1978. U.S. Department of Commerce, Maritime Administration.

- Maritime Administration
1981 New Ship Construction — 1980. U.S. Department of Commerce, Maritime Administration.
- Marsh, Robert M. and Hiroshi Mannari
1976 Modernization and the Japanese Factory. Princeton University Press.
- Meunch, George et al
1976 Study for the Improvement of Motivation in the Shipbuilding Industry. U.S. Department of Commerce, Maritime Administration and Newport News Shipbuilding and Dry Dock Company.
- Mitchell, Ron
(in press) Past History.
- Mongelluzzo, Bill
1981 Avondale Yard Tests Japanese Technology. Journal of Commerce, February 221A & 11A.
- National Academy of Sciences
1982 Productivity Improvements in U.S. Naval Shipbuilding. Report of the Committee on Navy Shipbuilding Technology, Washington D.C.
- Tornatzky, Louis, Trudy Solomon, et al
1982 Contributions of Social Science to Innovation and Productivity. American Psychologist, Vol 37, No.7: 0001-0010.
- Naval Sea Systems Command
1981 Annual Report of Status of Shipbuilding and Shipbuilding Industry of the United States — 1980. U.S. Navy, Naval Sea Systems Command.
- Piore, Michael
1974 Upward Mobility, Job Monotony and Labor Market Structure. (in) Work and the Quality of Life, ed. James OToole, Cambridge: MIT Press.
- Riesenfeld, Richard F.
1978 Recommendations for Computer Utilization in Shipbuilding. Office of Naval Research.
- Ross, Irwin
1981 The New Work Spirit in St. Louis. Fortune, November 1692-106.
- Seatrade
1981 Japanese Repost Smaller Shipyards But Bigger Ships. Seatrade, June 127-135.
- Shinto, Hisashi
1980 The Progress of Production Techniques in Japanese Shipbuilding. University of Michigan, Shipbuilding Short Course, October 27-31. .
- Smith, Larry
1982 The People of Lockheed Shipbuilding and Construction Company. Lockheed Shipbuilding Company.
- Sun News
1982 QWL Unique Labor-Management Effort Puts Pride Back in Shipyard. Sun News, January 9:4-5.
- Tweedale, James W.
1981 Productivity Navy Style. Proceedings of IREAPS Annual Symposium, 359-367.
- U.S. House of Representatives
1981 The Human Factor in Innovation and Productivity Hearings Before the Subcommittee on Science, Research and Technology. 97th Congress, First Session, Washington U.S. Government Printing Office.
- Westhagen, Harald and Einar Hotvedt
1980 Organizational Development in the Shipbuilding Industry. Norwegian Maritime Research. 8,3:14-19.
- Williams, Trevor
1982 Learning to Manage Our Future: The Participative Redesign of Societies in Turbulent Transition. New York John Wiley and Sons.
- 100A!
1982 South Korea's Industrial Revolution. 100A 1. April. 2-17.

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